BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 48] 1951 [No. 7

SUMMARY OF RECENT ABSTRACTS*

VI. PLAGUE

Epidemiology

KAUL (p. 353) has made a survey of the prevalence of plague in the world from 1939 to 1949 ; on the whole there has been retrogression. Details should be sought in the original.

FERGUSON (p. 537) describes the history of plague in part of South Africa, and the epidemiological features of the disease. The human disease is the result of the epizootics which occur in wild rodents, and the author describes the means used to control these rodents.

DAVIS (p. 354) has made a survey of sylvatic plague in Barotseland, noting the places where gerbils (the chief wild-rodent reservoirs) and multimammate mice (the chief intermediaries between wild and domestic rodents) are common. For control he advocates DDT in infested quarters and in clothing, and a campaign against rats in villages and gardens.

SEAL (p. 234) shows that plague appeared in Calcutta in 1948 after an absence of 22 years. In 1949 it appeared again, and there were pneumonic cases. The author advises the immediate administration of 2–4 gm. sulphadiazine daily to all who come into contact with pneumonic plague, and suggests that patients with plague should be given at least 1·0 gm. streptomycin before being removed to hospital.

Two cases of plague are reported from New Mexico (*Public Health Rep.*, p. 132). Both recovered after treatment, one with streptomycin and sulphadiazine, the other with penicillin and aureomycin.

Aetiology

ISSALY and DE ISSALY (p. 355) have found Broquet's fluid, with certain additions, very useful for maintaining the virulence of *Past. pestis* contained in spleen or bone marrow of infected guineapigs freshly killed.

HERBERT (p. 1195) has studied the factors affecting the growth of *Past. pestis* on agar. Isolated organisms do not grow unless blood or certain bacterial products are added to the medium, or unless anaerobic conditions are provided.

In the report of the Indian Research Fund Association for 1948 (p. 735) SOKHEY refers to the advantage of cultivating *Past. pestis* by the Dubos method.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1950, v. 47. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

MATUMOTO (p. 235) gives in detail the biochemical reactions of 69 strains of *Pasteurella pestis*, and notes that there are certain differences between strains. In particular, some strains ferment glycerin and some do not, and this test is therefore not valid for differentiation between *Past. pestis* and *Past. pseudotuberculosis*. There is probably a relationship between fermentation of glycerin and geographical distribution of strains of *Past. pestis*.

REYNES (p. 846) reports an atypical strain of *Past. pestis* from Indo-China, but in discussing the subject GIRARD suggests that possibly two organisms were isolated at first, causing confusion in the reactions, and that one of these subsequently died out, leaving *Past. pestis* to show its typical characters. The case from which this organism was isolated was not typical, and was of septicaemic-pyaemic type.

P'AN *et al.* (p. 847) describe the cytological changes produced in *Past. pestis* by specific bacteriophage.

By incorporating camphor in the culture medium, WON (p. 1195) has produced " giant " forms of *Past. pestis*, which grow more slowly than, but are as virulent as, the ordinary forms.

Transmission : Animal Reservoirs

DEVIGNAT (p. 536) writes of the various modes of transmission of plague, and estimates indices of transmissibility by means of mathematical formulae. Details should be sought in the original.

As a result of experiments on transmission of plague in Kenya, and of consideration of available evidence, ROBERTS (p. 736) concludes that the only fleas responsible for transmission there are *X. cheopis* and *X. brasiliensis*, and that *Rattus rattus* is the only rodent associated with outbreaks of human plague in Kenya. *X. cheopis* was found especially associated with rats living near the ground, and *X. brasiliensis* with rats living in roofs ; the close association of *X. cheopis* with human plague was due to specially close contact of this floor-living flea with the inhabitants.

YEH and DAVIS (p. 621) have studied the seasonal changes in the abundance of fleas on rats in Baltimore. Almost half the fleas were *Xenopsylla cheopis* and almost half were *Nosopsyllus fasciatus*. The proportion of rats infested with *X. cheopis* was 2·1 per cent. in spring but rose to 55·7 per cent. in summer, and to 64·7 per cent. in November–December. *N. fasciatus* was found on 50–59 per cent. of rats in December–June, but on only 5·2 per cent. in August–September.

A study of the distribution of sylvatic plague is recorded by GARNHAM (p. 354), who gives lists of animals suspected of being, or known to be, reservoirs of infection.

KRUMBIEGEL (p. 1080) has written a monograph on the Muridae of Europe and Asia, and their medical importance.

The rodents concerned with human disease, and the methods for controlling them, are described in a monograph by MATILLA GOMEZ and PIEDROLA GIL (p. 356), who write from Spain.

A hunter in New Mexico, who had shot and cleaned cottontail rabbits, developed bubonic plague. LINK (p. 847) describes a survey which was then made, and which disclosed the disease in cottontail rabbits and their fleas, although hitherto rabbits were not believed to be subject to epizootics of plague.

Clinical Findings : Treatment

SEAL and PRASAD (p. 356) describe an outbreak of pneumonic plague.

FAVAREL (p. 236) has elaborated an agglutination test for plague, having found a strain of *Past. pestis* suitable for the purpose. It is specially useful in retrospective diagnosis of recent attacks.

PANJA and GUPTA (p. 355) describe a simple slide-agglutination test which they regard as helpful in the diagnosis of plague.

A case of primary pneumonic plague in which treatment with sulphadiazine, penicillin, streptomycin and serum was given, and in which recovery occurred, is recorded by FENG (p. 737). Contacts of the patient were given sulphadiazine 4 gm. on the first day and then 3 gm. daily for 6 days ; there were no cases in these contacts.

In the report of the Indian Research Fund Association for 1948 (p. 735) WAGLE records the great value of streptomycin in treatment ; it had a more striking clinical effect than the sulphonamides in a series of cases of septicaemic plague. The use of DDT in villages caused a great reduction in flea population.

In 3 severe cases CHEN (p. 356) obtained excellent results with streptomycin in bubonic plague, though the buboes needed incision. These patients had not responded to sulphadiazine.

GIRARD (p. 236) obtained excellent results in pneumonic plague in guineapigs infected via the trachea, by administration of a course of streptomycin, even if this was not begun until 30 hours after infection. Streptomycin is bacteriolytic as well as bacteriostatic, *in vivo* and *in vitro*.

SOKHEY and HABBU (p. 1081) have shown that aureomycin and chloromycetin given by mouth are very effective in experimental plague in mice. They give details of dosage and note that the results achieved were similar to those obtained with streptomycin given subcutaneously.

Control

The W.H.O. Expert Committee on plague has issued its conclusions on control by the use of the new rodenticides, insecticides and drugs, but the view is expressed that wide-scale eradication of infection in wild rodents is still impracticable. Streptomycin seems to be the best drug in pneumonic plague, but is excreted too quickly to be useful for prophylaxis of this form of the disease. For this purpose sulphadiazine or sulphamerazine should be given in daily doses of 3 gm. for at least 5 days. The publication should be read in full.

In Kenya, ROBERTS (p. 1082) has used Cyanogas powder (which produces hydrocyanic acid) for fumigating thatch roofs, and notes that the cost of fumigating 50 huts at pre-war rates was £7 10s. Four treatments at intervals of one month reduced the numbers of rats and fleas by one half. For houses with corrugated iron roofs he used Cymag, which was cheaper, but because of the expense he advocates fumigation only when rats are dying and infestation is intense. For permanent control, rat-proofing of grain stores, and better housing, offer the only prospect of success.

HARRISON and WOODVILLE (p. 1081) note the feeding habits of house rats in Rangoon, and show that there was a marked preference for boiled rice, and that barium carbonate was an acceptable poison in it, in optimum range of 10–20 per cent.

The anticoagulant compound W.A.R.F. 42 is an effective rodenticide when time is allowed for its cumulative action. SCHEIN (p. 622) reports very good results in blocks of slum houses. The compound is harmless to handle in the laboratory, but the author does not discuss risk to domestic animals.

WANSON and CAMPHYN (p. 537) found that when rats were made to walk over a surface covered [presumably thickly] with 50 per cent. DDT powder, 93 per cent. of them died in 2 days, and that the powder was also lethal to gerbils. They found that by dusting the runs and holes of rats in storehouses they were able to establish complete control for 4 weeks. Care must be taken to avoid risk to domestic animals and human beings.

GROSS and BONNET (p. 461) find that snap traps are more effective than cage traps for rats and mice in Hawaii, where they are used in control of plague.

NICHOLSON and VETTER (p. 848) describe a gas trap for capturing small mammals and their ectoparasites.

MEYER (p. 737) has written a paper on the nature of immunity in plague, with special reference to prophylactic inoculation. This contains a discussion of a mass of information, and should be read in the original.

Charles Wilcocks

MALARIA

RUSSELL, P. F. **Malaria and Society.** *J. National Malaria Soc.* 1951, Mar., v. 10, No. 1, 1–7.

In his Presidential Address to the National Malaria Society Dr. Russell reviews, too briefly, the progress of malaria control and trends of thought on its future. Widespread control, until recently thought impracticable, is now common and the way to effective control throughout the world is wide open. The reaction of observers has, however, been very mixed. There is talk of the "hazards of health promotion by modern weapons" and of the danger of eliminating "natural checks and balances on a nation's population." Such comments lack perspective, a proper balance has never existed, and the maintenance of the existing order by withholding public health is mere negativism and not constructive sociology. Agricultural, educational, industrial and other improvements are useless to a society which lacks average good health, and excessive multiplication is the result, not the cause, of poverty. The proper attitude is that sanitarians have shown the way of advance in health, which is only one of the several fields where it must happen for good community development; this demonstration should be used as a basis for progress in other sociological fields rather than that sanitary science should be impeded to keep pace with the laggards.

On the other hand there has been an excessive optimism in some quarters. Enthusiasts call for anopheline eradication rather than control, without realizing that even eradication is not final and may be expensive. Others decry the need for further study of malaria, or for budgetary allocations for its control, thinking that the battle is won when it is just joined. Both these extreme attitudes are wrong. Malariologists, and all sanitarians, have a part to play in human development, but they should think of it in terms of steady progress, not haste; in terms of training staff and developing public health departments rather than in charitable gifts of DDT or random expert advice.

G. Macdonald

NOYAN, A. Die geographische Verteilung der Malaria in der Türkei. [**The Geographical Distribution of Malaria in Turkey.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, Jan., v. 2, No. 3, 338–50, 5 figs. (1 map). [19 refs.]

Turkey forms a rather mountainous land mass, 95 per cent. of it being more than 200 m. (660 ft.) above sea level and most localities being over 1000 m. (3,280 ft.). In respect of malaria, the country can be divided into two main regions: the coastal belt (25 to 50 miles wide) and the interior. The climate of the coastal zone is as follows: rainfall, 16 to 34 inches annually; mean annual temperature, 13·8 to 19°C. (56 to 66°F); relative humidity 60–75 per cent. In the interior, the rainfall is heaviest in the south-east (approx. 30 inches) and scanty in Central Anatolia (6 to 20 inches). Mean annual temperatures are 8–10°C. (46–50°F.) in Anatolia; but there is often a great variation in

daily temperature of 25 to 30°C. Relative humidity is 40 to 67 per cent. The climatic conditions of the coastal zone between May and September are favourable for malaria mosquitoes and the area is quite heavily populated (25 to 50 people per sq. km. in most places). Malaria is either highly or moderately endemic, the parasite index in highly endemic areas being above 25 per cent.

In the interior of the country, malaria is generally lower. In some zones there are patches of indigenous malaria here and there. In the mountainous districts, autochthonous malaria does not exist ; but, since the land is poor, there is much movement of workpeople to and from the plains, so that isolated cases of the disease may occur in the hills.

The anopheline species in Turkey are *A. maculipennis, claviger, sacharovi, algeriensis, hyrcanus, plumbeus* and *superpictus*. The *maculipennis* complex is represented by *typicus, messeae* and *melanoon*, all of them zoophilic and not serious malaria carriers. In fact, the malaria in Turkey seems to be all carried by *A. sacharovi* and *superpictus*.

The malaria blood parasites in Turkey are *Plasmodium vivax, P. falciparum* and *P. malariae*, the last mentioned being comparatively rare. *P. ovale* has not been found. The author has had a very long experience in malariology and he remembers clearly that there was much less prevalence of *P. falciparum* before 1914, though the records have been lost or destroyed.

Malaria control on a national basis was commenced in 1924, the highly endemic regions being attacked first. The organization of doctors and sanitary personnel is briefly described. Drug treatments used were ; quinine 1–1½ gm. for 7 weeks, or atebrin [mepacrine] 0·3 gm. per day for 7 days followed by the same dose for 3 times a week for 6 weeks. Towards the end of the second world war, supplies of both drugs were running low, and some economies had to be used. After the war, plentiful supplies became available and in recent years there is evidence of a decline in numbers attending malarial hospitals and in the spleen indices.

In the post-war period, DDT has been employed against the mosquitoes. A large number of houses were sprayed 3 times annually with 5 per cent. DDT in oil. At the same time, widespread use was made of DDT as a larvicide (2 per cent. in oil). In 1948, 70 tons of DDT was used to treat 10,000 villages, containing 2 million houses. *J. R. Busvine*

DE MELO, I. F. A malária, a tuberculose e a lepra em Goa. [**Malaria, Tuberculosis and Leprosy in Goa.**] *Anais Paulist Med. e Cirurg.* 1951, Jan., v. 61, No. 1, 7–16.

This is a Conference paper and deals with the subjects of the title in very general terms. Malaria in the more littoral zones is evidenced by a splenic index of 3–5 per cent., in marked contrast with places in the interior where "80–100% have hypertrophied spleens, some extending to the right iliac fossa". Certain northern districts are highly endemic, even hyperendemic. The ancient town of Goa, now practically a mass of ruins, has only a small population but all are malarious, whereas the people round about are almost free, with a parasitic index of only 3–7 per cent. The transmitting Anopheles are *A. stephensi* and *fluviatilis*.

The author says very little on tuberculosis or leprosy. For the former the provision of beds in hospital for advanced cases and the use of BCG are mentioned. For leprosy patients the general outlook is poor ; thrust out by their families many of them live in thatched huts or on some plot near the family and exist on charity, others sleep in outbuildings of schools or temples. There are said to be some 300 severe cases among a population of 600,000. A colony has been established, the leprosarium of Macazana, and testing contacts for infection is another prophylactic measure. *H. Harold Scott*

LANGUILLON, J. L'endémo-épidémie palustre en Guadeloupe. [**Epidemiology of Malaria in Guadeloupe.**] *Rev. Service Santé Publique Guadeloupe.* 1951, v. 2, No. 3, 11–24.

The paper consists of a general account of malaria in Guadeloupe, introduced by notes on geography and climate.

The spleen rate in children generally ranges between 5 and 20 per cent., and gross splenomegaly is most unusual. *Plasmodium falciparum* accounts for 98 per cent. of several hundred positive blood films, *P. malariae* for the remainder. The absence of *P. vivax* appears to be well established and is remarkable, particularly as a considerable proportion of this parasite was formerly reported.

Anopheles aquasalis, albimanus and *argyritarsis* are found. The author gives brief notes on their breeding habits, but does not demonstrate which of them transmits malaria in Guadeloupe. *P. A. Buxton*

GARNHAM, P. C. C. **Some Effects on the Community of Malaria Eradication with special reference to the Relapse Phenomenon.** *East African Med. J.* 1951, Jan., v. 28, No. 1, 6–10. [16 refs.]

Malaria eradication is always associated with a change in the relative proportions of the different species of parasite, *Plasmodium falciparum, P. vivax* and *P. malariae* disappear in that order, and therefore the initial predominance of *P. falciparum* gives place first to that of *P. vivax* and then of *P. malariae.* Relapses are attacks of malarial fever occurring at least a month after the previous attack ; the absolute maximal intervals are long, but as a rule the time required for the disappearance of the three species after the establishment of full control is 9 to 20 months for *P. falciparum,* 3 years for *P. vivax* and 4 years for *P. malariae.*

Relapses of *P. vivax* and *P. malariae* infections are due to liberation of merozoites from exo-erythrocytic forms in the liver. Liberation is probably continuous, but as a rule escaping merozoites are destroyed by an immunity mechanism ; the reduction of this immunity causes relapse. There is no such production of additional exo-erythrocytic forms of *P. falciparum* in the liver and no true relapses of this infection are known ; recrudescences are due to multiplication of parasites which have been continuously present in the blood.

G. Macdonald.

WEYER, F. Neuere Beobachtungen über Anopheles in Deutschland. (Mit einem Beitrag zur Nomenklaturfrage bei *A. maculipennis.*) [**Further Observations on Anophelines in Germany. The Question of Nomenclature in the** *A. maculipennis* **Group.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, Jan., v. 2, No. 3, 367–401. [Numerous refs.]

The English summary appended to the paper is as follows :—

" 1. Relying on his own studies and other available data the author attempts a critical survey of *Anopheles* research in Germany during the war and post-war period.

" 2. Since most observations refer to the *A. maculipennis* group the question of so-called races of *maculipennis* is discussed with regard to taxonomy and nomenclature. The author considers the various " races " distinct species and proposes to classify them under the names of *A. atroparvus, A. messeae, A. typicus.*

" 3. Ascertained anopheles findings in Germany are tabulated, especially those of the *maculipennis* group. The majority of data were obtained in

Northern Germany, Brandenburg and South Württemberg ; anopheline habitats outside Germany were mentioned for comparison.

" 4. There are reports from South Württemberg ; commenting on breeding habits of *A. bifurcatus* and the presence of *A. nigripes* in stables. In some places *A. bifurcatus* is a stable dweller like *maculipennis*. Often enough *A. bifurcatus* is found breeding together with *A. messeae* a trait which distinguishes *A. bifurcatus* as a dweller of open country with large water surfaces of constant temperature and high humidity of air. In South Württemberg *A. typicus* is regarded as a form [characteristic] of dry cultivated country being often found in small and artificial breeding places of unsteady temperature.

" 5. It is surmised that the composition of anopheline fauna has changed in the last decades and that this shift of population may be responsible for the outbreaks of autochthonous malaria in post-war Germany. Both contentions must be denied, at least for Northern Germany. Only in some cultivated areas of Southern Germany *A. typicus*, because of its breeding habits and climatic preferences, increases seemingly at the expense of *A. messeae*.

" 6. Malarial rate in post-war Germany has grown for the following reasons : parasite carriers are more numerous ; anophelines finding better opportunities to breed and to suck have multiplied ; poor housing and scarce living quarters have brought man and mosquito in closer contact. On the other hand, in East Friesland where malaria was always endemic anopheline density seems diminished for reasons not yet clarified and malaria practically extinct."

GAUD, J., FAURE, J. & MAURICE, A. Biogéographie des espèces anophéliennes au Maroc. [**Biography of Anopheline Species in Morocco.**] *Bull. Inst. Hyg. Maroc.* 1949, v. 9, Nos. 3/4, 145–64, 8 figs. (2 on pls.) [24 refs.]

The following anopheline mosquitoes occur commonly in French Morocco : *Anopheles claviger*, *A. maculipennis* (var. *sicaulti*), *A. sergenti*, *A. turkhudi* (var. *myzomyifacies*) and *A. multicolor*. Three other species are not so common : *A. algeriensis*, *A. coustani*, and *A. marteri*.

This study is concerned mainly with *A. maculipennis*, *A. claviger*, *A. sergenti* and *A. turkhudi*. The geographical and seasonal data are discussed and show that of these four species, the first two predominate in the early half of the year, and in the north-west of the country, while the other two are more abundant in the second half of the year and in the south-east. In the plains, one finds *A. maculipennis*, *A. sergenti* and *A. multicolor*, but *A. turkhudi* and *A. claviger* are commoner in the hilly regions.

Keys are given for the identification of the females and larvae of the above eight species, and included in the keys in addition are the following species which have not yet been recorded from French Morocco : *A. hyrcanus*, *A. gambiae*, *A. superpictus* and *A. broussesi*. *H. S. Leeson*

BERNET, J. Contribution à l'étude sur le pistia stratiotes en A.O.F. [**Study of the Aquatic Plant *Pistia stratiotes* in French West Africa.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1950, v. 7, No. 1, 75–90.

See also p. 677, GIAQUINTO-MIRA, **Notes on the Geographical Distribution and Biology of " Anophelinae " and " Culicinae " in Ethiopia.**

DOWNS, W. G. **Growth Changes of Anopheline Eggs in Water and in Saline Solutions.** *J. National Malaria Soc.* 1951, Mar., v. 10, No. 1, 17–22, 3 graphs. [10 refs.]

The author has studied eggs of *Anopheles albimanus*, *A. pseudopunctipennis* and *A. aztecus*. In the 24 hours following oviposition on water, they increased

in all dimensions (12 to 25 per cent. in length). In solutions of sodium chloride up to 0·2N some increase took place, but it was less the greater the concentration of salt : at higher concentrations, shrinkage occurred. Development of the embryo took place up to 0·2N or 0·3N, but not at higher salinities.

Contact with emulsions of DDT and benzene hexachloride did not prevent development and hatching of eggs. *P. A. Buxton*

ABDULAEV, D. M. [**Cerebrospinal Fluid in Comatose Malaria.**] *Klinicheskaja Medicina.* Moscow. 1950, Aug., v. 28. No. 8, 67–9. [In Russian.]

In order to relieve the symptoms of meningo-encephalitis, the author resorted to lumbar puncture in 27 cases of malarial coma, and has carried out a detailed examination of the cerebrospinal fluid. This was found to have undergone marked changes, consisting mainly in an increase of the pressure of the fluid, in an increase of the amount of sugar, and in a pronounced decrease of reserve alkalinity. In the majority of cases there was no change in the protein content and cell-count. *C. A. Hoare*

REEBSTEIN, H. Ein Beitrag zur Diagnostik und Therapie der Malaria unter besonderer Berücksichtigung der chron. Formen. [**The Diagnosis and Treatment of Malaria in relation to its Chronic Forms.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, Jan., v. 2, No. 3, 362–6.

These observations were made in the Charkow district of the S. Ukraine. The prevailing infection was *Plasmodium vivax* ; *P. falciparum* and *P. malariae* were seldom observed.

At first when the rigors and attacks were typical, no great difficulty was experienced in arriving at a diagnosis, but in those who had taken prophylactic measures for years and in whom the disease appeared in a veiled or larval form the question of making a correct diagnosis caused anxiety. This entails repeated microscopic blood examinations which are usually negative. It is therefore imperative to give a thorough course of atebrin [mepacrine] treatment whenever suspicions are aroused. Splenomegaly may also be absent and cannot be considered a safe diagnostic feature in benign tertian. Small non-palpable spleens can sometimes be determined by percussion. The surest guide is the general appearance and the facies with yellowish-brown complexion. Basophilia and the presence of pigmented leucocytes are of course decisive. One symptom which is of considerable importance in differential diagnosis is the deep sensibility on pressure of the abdominal and back muscles ; the hyperaesthesia being regulated by the boundaries of Head's areas. The author also reports the discovery of 5 atebrin-resistant cases, with frequent relapses. These apparently were eventually cured by salvarsan injections. *P. Manson-Bahr*

CHERVINSKIJ, I. A. [**The Course and Duration of Malarial Infection at Different Ages.**] *Pediatrija.* Moscow. 1950. No. 4, 3–8. [10 refs.] [In Russian.]

Since opinions regarding the influence of age upon the course and duration of malarial infection are divided, the author records his own observations, based on the material available at the clinical department of the malarial research institute of Rostov-on-Don. This comprised cases of benign and malignant tertian malaria in children belonging to two groups : (*a*) up to the age of 4 years and (*b*) from 4 to 15 years old.

In infants the acute phase of malaria frequently manifested a number of peculiarities. Thus they had convulsions, there was dyspepsia, rigor and sweating were absent, the duration of the paroxysm was shorter than in adults,

and the temperature curve was irregular. These peculiarities gradually disappeared in older children : in those under the age of 4 they were less frequent and not so marked, while in those above this age convulsions were absent and the other symptoms were still milder. However, all these peculiarities are of secondary importance and do not affect the prognosis unfavourably. The duration of the infection in the different age-groups showed no unusual features.

C. A. Hoare

GRENNAUS, G. I., TROITSKIJ, S. A. & MILORADOVSKAJA, B. A. [**Fulminating Tertian Malaria in Children.**] *Pediatrija.* Moscow. 1950, July–Aug., No. 4, 12–15. [In Russian.]

Cases of a fulminating type of benign tertian malaria have been reported chiefly from the central area of the Soviet Union. The pathogenesis of this serious condition is not yet clear, though a number of hypotheses have been advanced to explain it. In the present paper the authors describe the clinical course and epidemiology of fulminating malaria, which they have studied in children in the course of several years.

The great majority of cases (72·3 per cent.) occurred in the second quarter of the year, with a maximum in May, whereas there were only 8·4 per cent. in the first and 15·6 per cent. in the third quarter. The age-incidence (per cent.) was as follows : up to 1 year 3·7, 1–6 years 13·4, 7–12 years 40·7, 13–17 years 23·5, 18–29 years 12·3, 30 years and older—6·4. An analysis of the incidence of fulminating malaria in children showed that it was not correlated with the general malarial incidence among them. The disease runs an acute course terminating fatally during the first, second or third paroxysms of primary or relapse malaria. On the day preceding and during the morning of the fatal paroxysm the child may feel well. The rigor appears suddenly and is accompanied by severe headache, after which the paroxysm assumes a violent character : the temperature rises, there is vomiting and convulsions, the patient loses consciousness and dies within 1–3 hours, frequently before the physician can be summoned. Autopsy reveals the presence of *Plasmodium vivax* in the blood and typical pathological anatomical changes : cerebral oedema, flattening of the convolutions, and hyperplasia of the spleen.

The authors emphasize the importance of the differential diagnosis of the fulminating type of B.T. malaria from meningitis, tetanus, uraemia, etc., and of its immediate treatment, without waiting for the results of the examination of blood films.

Brief clinical notes are given of 8 cases. *C. A. Hoare*

SITNITSKAJA, I. G. [**Malaria in Infants and Young Children after Blood Transfusion.**] *Pediatrija.* Moscow. 1950, July–Aug., No. 4, 16–9. [In Russian.]

In U.S.S.R. blood transfusion is widely used in hospitals for children as a stimulating factor increasing the resistance of the patient in a number of diseases. Under these conditions there have been a number of cases of infection with malaria, acquired from donors who had either concealed or were unaware of their own infection. The author describes 25 cases of B.T. malaria in infants and children up to the age of 3 years, resulting from blood transfusion. The source of infection was traced to 3 ampoules, in two of which blood had been preserved for one day, while the third had been kept for 6 days. The last finding contradicts the generally accepted view that the malaria parasites in preserved blood die within 4 days. The incubation period of transfusion malaria in children varied from 2 to 32 days. Its course and effects, which are described in some detail, follow the well-known pattern of induced malaria.

C. A. Hoare

BYSTRITSKIJ, I. A. [**Clinical Features of Congenital Malaria.**] *Pediatrija.* Moscow. 1950, July–Aug., No. 4, 9–11. [15 refs.] [In Russian.]

The author records observations on 28 cases of congenital malaria observed by him from 1934 to 1948 in Ufa, Kujbyshev and Kursk. In 10 infants the weight at birth was below normal (1·5–2·7 kgm.) while in 17 it was normal. It is assumed that in the former cases the infection was intrauterine through the placenta, while in the latter it took place during labour, as the result of the mixing of the maternal and foetal blood, owing to rupture of the vessels of the placenta or to puerperal trauma.

It is pointed out that congenital malaria is a grave condition which is liable to terminate fatally, if it is not diagnosed early and treated properly. If congenital malaria is treated systematically with acriquine [mepacrine] or quinine, the prognosis can be quite favourable. The clinical symptoms—splenitis, hepatitis and anaemia—were confirmed by the finding of malaria parasites in blood films. *C. A. Hoare*

BAISHEVA-ZEJNALOVA, G. M. [**Relapses in Protracted Malaria.**] *Klinicheskaja Medicina.* Moscow. 1950, Aug., v. 28, No. 8, 62–6. [In Russian.]

After commenting on the effectiveness of modern antimalarial drugs in the treatment of primary attacks and the suppression of relapses, the author records observations carried out in the Caucasus on 32 patients who were suffering from persistently relapsing malaria, in spite of repeated courses of treatment with acriquine [mepacrine], plasmocide [rhodoquine] and quinine. Among these patients were 4 cases of *P. vivax* malaria and 12 of *P. malariae,* while the remaining cases had mixed infections (*vivax*+*falciparum, falciparum* +*malariae,* and—in one instance—all the three forms). These cases comprised both relapsing primary infections and reinfections. The author regards the protracted type of malaria as a distinct clinical entity, characterized in most cases by frequent febrile paroxysms, though in some cases there is no fever, but parasites are present in the blood. It is suggested that some of the relapses actually represented reinfections or superinfections with new strains of parasites, against which the patients had not acquired an immunity. It is also thought that protracted malaria can be brought about by mixed infections, as well as by an increase in the virulence of local strains of parasites. Furthermore, relapses are said to be influenced by various provocative factors.

In discussing the origin of relapses, the author considers the localization of the parasites during the latent periods of the infection. She believes that they are invariably present in very small numbers in the peripheral blood. In support of this view she quotes the observations of some Russian workers, who, after having failed to detect any parasites in thick blood films, demonstrated their presence in the peripheral blood of the patients by successful infection of G.P.I. patients and mosquitoes. From these experiments it is concluded that relapses are due to multiplication of these blood forms. As regards the rôle of exoerythrocytic stages in the production of relapses, it is merely stated that some authors [only JAMES and RAFFAELE are named] " admit the existence of endothelial and non-pigmented stages of development of the malaria parasites ". *C. A. Hoare*

SCHNEIDER, J. Etude pharmacodynamique et thérapeutique des antipaludiques de synthèse chez l'homme. [**Pharmacological and Therapeutic Studies of Synthetic Antimalarials in Man.**] Reprinted from *Actualitiés Pharmacol.* Paris : Masson et Cie. 1951, 3rd Ser., 107–55, 3 figs. [246 refs.]

This article embodies the subject matter of a lecture in a series devoted to the treatment of malaria. The author has drawn on his own experience as

well as making a wide survey of the literature, as the number of references quoted indicate. A clear account is given of the new antimalarials developed since the first product of this nature, plasmoquine [pamaquin], was introduced by SCHULEMANN in 1926. French workers, especially FOURNEAU, also produced a number of useful drugs, but since 1939 British and American workers have contributed most to the development of new antimalarials. The various substances in current use are dealt with under the headings curative treatment, prevention of relapses, prophylaxis, toxicity, blood levels and excretion. No drug of importance is omitted and the special characters and effectiveness of each, alone or in combination, are described. Chloroquine [resochin, aralen, nivaquine B] ranks high, in the author's view, as a schizonticide. For the treatment of acute attacks of malaria quinine, atebrin [mepacrine, quinacrine], chloroquine and other 4-aminoquinolines and paludrine [proguanil, chlorguanide] are satisfactory. The value of combinations such as quinine with plasmoquine, first used by SINTON & BIRD [this *Bulletin* 1929, v. 26, 14], and quinine with other 8-aminoquinolines such as pentaquine or iso-pentaquine, for the prevention of relapses in *P. vivax* malaria is acknowledged. By prophylaxis the author means protection against malaria without defining precisely the mechanism, and therefore causal prophylaxis, suppression and the breaking of the developmental cycle by gametocidal drugs are included. The important rôle of atebrin as suppressant and its optimal dosage are discussed. The 4-aminoquinolines chloroquine and sontochin (the methyl derivative of chloroquine) are also effective suppressants. As with atebrin their longer retention in the body than most others contributes to their effectiveness. The author is critical of paludrine as a causal prophylactic. Its value in individual and collective prophylaxis with reduction in the parasite reservoir is acknowledged. Attention is drawn to the phenomenon of drug-resistance associated with the use of this drug. In describing effects associated with the use of atebrin the author maintains that dermatoses have not been encountered by French workers. Newer drugs such as sontochin, chloroquine and paludrine are generally much better tolerated than the earlier synthetic products. Pharmacology, blood levels, metabolism, distribution and excretion of new substances are now studied on an extensive scale. The value of a loading dose at the start of treatment has been repeatedly vindicated. *J. D. Fulton*

MESSENT, J. J. **Chloroquine.** [Correspondence.] *Brit. Med. J.* 1951, Apr. 14, 818–19.

This correspondent refers briefly to the use of chloroquine diphosphate in the form of aralen tablets, used for the suppression and treatment of *P. falciparum* malaria infections in the Gold Coast.

Ten Europeans, who had been taking suppressive quinine, mepacrine or proguanil, changed to chloroquine. They started with a loading dose of 4 tablets of aralen (1 gm.) in the first week and thereafter two tablets (0·5 gm.) weekly. Within three weeks, three of them were suffering from proved malaria. All but two of the original ten returned to their original suppressive : the two continuing on chloroquine remained free from attacks.

The three infections were treated with aralen. Two received an initial dose of 1 gm. followed by 0·5 gm. eight hours later, and 0·5 gm. daily for two days (2·5 gm. in all). The third received 5·5 gm. over a period of nine days : this patient had pronounced visual disturbances, which indicated that the drug was being absorbed.

All three had symptoms and parasitaemia at the end of treatment, but one of those on the smaller dose cleared on the fourth day. The other two were started on mepacrine and improved rapidly.

The response in these few cases did not seem to be altogether satisfactory. It is suggested that the parasites in the area may be resistant to chloroquine, as they are to proguanil, or that the dosage used was inadequate [see also this *Bulletin*, 1949, v. 46, 325 ; 1950, v. 47, 956]. *H. J. O'D. Burke-Gaffney*

MENK, W. & MOHR, W. Sontochin (Nivaquine) in seiner therapeutischen Wirkung bei Malaria. [**Sontochin (Nivaquine) in the Treatment of Malaria.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, Jan., v. 2, No. 3, 351–61, 7 figs. [10 refs.]

Sontochin, also known as Nivaquine (in England and U.S.A.), has given good results in malaria therapy as has been proved by the authors in 1,100 clinical cases. By these means tertian, quartan and subtertian malaria are cured by it, even in the comatose forms, the most dreaded complication of all. Sontochin, however, does not act on the tissue stages of the plasmodia and does not prevent relapses, but as an agreeable and efficient drug to take it deserves a place in general prophylaxis as well as in clinical therapy and in this opinion many European and American workers concur. The dosage varies somewhat. For routine treatment a seven-day course of 0·1 gm. three times daily or a five-day course of 0·2 gm. three times daily is recommended, combined with, or followed by, plasmoquine ·02 gm. for three days. For all tertian cases a total dosage of 3 gm. suffices. The average case will call for 2·1 to 2·5 gm. which is slightly higher than in atebrin [mepacrine] medication. Gravely ill patients should be given daily doses of 0·4 to 0·6 gm. in divided doses, intravenously or intramuscularly, to be continued by oral doses after three or four days. Sontochin solution can be kept in ampoules ready for injection which is of great practical value.

P. Manson-Bahr

STRAUS, B. & GENNIS, J. **Radical Cure of Relapsing Vivax Malaria with Pentaquine-Quinine : a Controlled Study.** *Ann. Intern. Med.* 1950, Dec., v. 33, No. 6, 1413–22, 1 fig. & 6 charts. [19 refs.]

All the patients studied in this investigation were war veterans under treatment in the Veterans' Administration Hospital, Bronx, New York. Alternate patients admitted with proved *vivax* malaria were treated either with chloroquine or pentaquine. Forty-nine patients were treated with chloroquine, 50 with pentaquine. The two groups were strictly comparable. The average duration of malaria infection was 24·5 months in the chloroquine group, 23·0 months in the pentaquine group. The average number of relapses before therapy in the two groups were 5·5 and 4·8 respectively. The great majority of all patients had served in the Pacific area.

Chloroquine diphosphate tablets were used ; the dosage in terms of base was : 0·6 gm. initial dose ; 0·3 gm. after six hours ; 0·3 gm. on each of 2nd and 3rd days : total dose 1·5 gm. base.

Pentaquine monophosphate was given in a daily dose of 30 mgm. of base, 10 mgm. every eight hours given with 0·6 gm. of quinine sulphate. This was continued for 14 days. Electrocardiograms of patients treated with pentaquine were taken before and after therapy ; complete blood counts and urine examinations were done twice weekly.

Follow-up studies were made at approximately monthly intervals on all patients : 80 per cent. of the chloroquine group and 66 per cent. of the pentaquine group were observed for one year or more.

Only one of the 50 patients treated with pentaquine relapsed during the follow-up period, the interval to relapse being 115 days. There were relapses in

17 of the 49 chloroquine-treated patients, one patient had four relapses, 2 had two relapses each and 14 had one relapse each. The shortest interval to relapse was 44 days, the longest 395 days.

In no case was it necessary to discontinue pentaquine on account of toxicity. Cinchonism in one case necessitated discontinuance of quinine. Nausea and anorexia were common during the first four days of treatment. No frank haemolytic reactions were observed, but six patients showed a drop of one million red cells or less during the course of treatment. Drug fever varying from 99·6 to 103·4°F. developed in seven patients from the 7th to 11th day of therapy and subsided spontaneously in one day without modification of treatment. Chloroquine toxicity was negligible ; two patients complained of pruritus.

Pentaquine administered concurrently with quinine proved to be a highly effective curative agent of *P. vivax* malaria though the dose of pentaquine administered was but half of that previously recommended. *Norman White*

KRUSÉ, C. W., PHILEN, E. A. & LUDVIK, G. F. **Characteristics of Larvicidal Sprays applied by Aircraft for the Control of** *Anopheles quadrimaculatus* **on Impounded Water.** *J. National Malaria Soc.* 1951, Mar., v. 10, No. 1, 23–34, 3 figs.

The Tennessee Valley Authority is endeavouring to maintain its programme of control of *Anopheles quadrimaculatus*, but not to allow the cost to increase : it must, therefore, give attention to methods which will be effective though employing less human labour. The " principal strategy " is to manage the level of the water in the immense reservoirs in such a way as to reduce the amount of vegetation in the water close to the shoreline : other steps are taken with the same intention. From time to time, owing to local storms, emergencies arise and large numbers of larvae may be discovered. These are dealt with by four units which put down sprays from aircraft where need arises.

The present report is one of a series in which careful attention is given to the delivery of spray from aircraft : it forms an important contribution to this difficult subject. Much of the paper is devoted to the study of the larvicide which reaches the surface of the ground or water, when sprayed from a height of about twenty-five feet above woodland, the spray solution being DDT in a polymethylated naphthalene, applied at 0·05 to 0·1 lb. per acre. In this woodland, eleven sampling stations were used and spray was put down on thirteen occasions. The results of six of these are shown graphically : in each of them there is a rise of kill closely related to the number of spray particles and to the total mass of spray which reach the ground : we suppose that the differences are due to different sampling positions across the line of flight of the aircraft. It appears to be established that the effect of the woodland is to remove many of the larger spray droplets (presumably because their momentum carries them straight, so that they hit leaves and twigs, and fail to reach the water). The authors conclude that for penetration of forest, droplets should fall into the 50 micron class : they publish an interesting table, showing the percentage distribution of droplets of different sizes above the canopy and below it. Similar investigations were carried out in an area covered with grass about six feet high, without trees. Though this vegetation was dense a greater proportion of the spray reached water level than it did beneath the forest, so that it would be possible to obtain a satisfactory result with a much lower dosage of insecticide. These results are discussed in relation to the theoretical work of JOHNSTONE and his colleagues.

Similar work was carried out with DDT delivered from the air as a thermal aerosol and the two methods are compared graphically, the insecticide being

estimated at ground level. The aerosol was roughly ten times more efficient than a spray with a mass median diameter of 70 to 150 microns : a hundred per cent. kill of larvae being achieved with 0·01 lb. of DDT per acre in the form of aerosol. It is, however, indicated that in practice it is much easier to obtain a consistently satisfactory result with a spray and one would suppose that the lower dosage required for aerosol would not make a great reduction in total cost. Aerosols are peculiarly difficult to aim, because the minute particles have a very low final velocity, and may drift great distances.

[Insecticidal sprays have been used empirically for a number of years and it is refreshing to see a paper that is based on thorough groundwork and a careful consideration of an extremely difficult scientific problem. We hope that the authors will continue this work but that they will furnish us with fuller information. In the present paper we are left to assume that all the larvae are those of *Anopheles quadrimaculatus* : there is no botanical description of the forest and no photograph of it : there is no information as to climatic conditions at the time the spray was put down, though this is a most important matter, partly in relation to drifts of particles and also to evaporation of the solvent in the droplets.] *P. A. Buxton*

LUDVIK, G. F., SNOW, W. E. & HAWKINS, W. B. **The Susceptibility of *Anopheles quadrimaculatus* to DDT after Five Years of Routine Treatment in the Tennessee River Valley.** *J. National Malaria Soc.* 1951, Mar., v. 10, No. 1, 35–43, 1 fig.

Large-scale field applications of DDT against larvae and adults of *Anopheles quadrimaculatus* have been used regularly, in certain areas of the Tennessee River Valley, since 1945. In the 1950 season, laboratory and room tests were conducted to ascertain whether five years of practical use of DDT had affected the level of resistance of the mosquito. Specimens were caught in areas regularly treated with DDT and compared in tests side by side with other specimens obtained from a region where no DDT had been used.

Resistance of the larvae was tested by exposure to 0·2 and 0·1 p.p.m. of DDT, with mortalities counted after 18 hours. Resistance of the adults was investigated by enclosing them in small cardboard boxes with interiors coated with DDT at 200 mgm. /sq. ft. for 10 to 90 minutes.

Another type of experiment was to release mosquitoes from the two areas, simultaneously, in a treated room. The insects from the area under DDT control were distinguished by previous spraying with a fluorescent dye. The numbers escaping to a window trap were counted and also the percentage of mortality of both stocks of mosquito inside the room and in the trap were determined after 72 hours.

All these experiments gave rather similar results. The mortalities were usually slightly higher in the insects collected in the untreated zone, but in only one case was the difference statistically significant. All the differences in mortality were slight and were considered to be of no practical importance.

A further test was conducted with pairs of mosquito traps, one treated with DDT and one untreated. A series of these traps was set up in the DDT sprayed zone and another set in the untreated zone. In all the observations there were many more mosquitoes resting in the untreated traps, because of the irritant property of DDT. The overall figures for both zones averaged exactly the same ; 98·1 in untreated and 1·9 in treated traps. Hence there is no apparent difference in reaction of the mosquitoes to DDT. *J. R. Busvine*

FLOCH, H. Les résultats de la "dédétisation" en Guyane française: destruction de "Aedes aegypti", et réduction spectaculaire du paludisme. [**Eradication of *A. aegypti* and Striking Reduction of Malaria in French Guiana with the Use of DDT.**] *Rev. Paludisme et Méd. Trop.* 1951, Mar. 15, v. 9, No. 82, 49–57, 2 charts.

French Guiana, with an area of about 33,000 sq. miles, is sparsely populated. The greater part of its 30,000 inhabitants live in the coastal belt, 11,000 of them in Cayenne. The death rate is about equal to the birth rate and this precarious demographic balance is upset in years of bad malarial epidemics. The malaria is carried almost exclusively by *Anopheles darlingi* and the parasites are mainly *P. falciparum* (80 per cent.) and *P. vivax* (18 per cent.). Apart from malarial mosquitoes, there are dangerous Culicines present; *Aëdes aegypti*, which represents a constant threat of the return of urban yellow fever epidemics, and *Culex fatigans*, which has been found infected with *Wuchereria bancrofti* to the extent of 11 per cent. All three species of mosquito are house-haunting, and all were attacked by the DDT spraying campaigns which were carried out in 1949 and 1950. In the first year a kerosene solution was used, but the more efficient wettable powder was introduced in 1950; some 4,000 kgm. of DDT were used altogether to protect the houses of 11,000 people in 1949 and of 23,000 people in 1950. The cost was low, amounting in 1950 to 243 francs per person.

Very satisfactory results were obtained. Both *Aëdes* and *Anopheles darlingi* disappeared from houses and a few weeks after the spraying, the larvae of *A. darlingi* also became very rare. Cases of malaria declined and the parasite index was slightly reduced in 1949 and greatly lowered in 1950. Bugs, lice, fleas and houseflies were controlled as a result of the house-spraying. There was some evidence of the emergence of resistant strains of houseflies and *Culex fatigans*.

[Extensive work of this kind has been done in British Guiana since 1945. It is summarized by GIGIOLI; see this *Bulletin*, 1949, v. 46, 183.]

J. R. Busvine

DE BUSTAMANTE, F. M., PIRES, W. DA M. & GUSMAO, J. B. Sôbre a densidade do *A* (*N*) *tarsimaculatus* Goeldi, 1905 (=*A* (*N*) *aquasalis* Curry, 1932) em área da Baixada Fluminense sujeita a aplicaçoes intradomiciliares de DDT. [**The Density of *Anopheles aquasalis* in the Area of Baixada Fluminense, Brazil, treated by DDT House Spraying.**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1950, July, v. 2, No. 3, 266–71. English summary.

The chief malaria vectors in the county of Magé, Rio de Janeiro, are *Anopheles darlingi*, *Anopheles aquasalis* and *Anopheles albitarsis*. *Anopheles aquasalis* occurred in greater numbers than the other two species in captures in Shannon "dawn traps". Houses in the area were sprayed with a DDT emulsion giving a deposit of 1·5 to 2·0 mgm. per sq. metre in December 1947, April and November 1948, April and November 1949, and again in March 1950. Captures of mosquitoes made in houses during the three years of spraying showed no decrease in either the total number of Anophelines, or of *A. aquasalis*.

C. M. Harrison

RACHOU, R. G., FERREIRA, M. O. & LIMA, M. M. O sulfato de cobre como bromelicida ; sua primeira aplicaçao em Santa Catarina (Brasil) ; resultados preliminares. [**Preliminary Results of the Use of Copper Sulphate for the Destruction of Bromeliads in Santa Catarina, Brazil.**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1950, Oct., v. 2, No. 4, 306–17, 2 figs. & 1 map. English summary.

In the coastal belt of Brazil, as in the island of Trinidad, malaria is carried by mosquitoes which breed in water collecting in plants known as bromeliads. One method of control is to destroy the bromeliads and the authors describe and compare two methods of doing this. In one area of roughly 700,000 m², containing nearly half a million bromeliads, the plants were sprayed with a 1 per cent. solution of copper sulphate. An American compressed air spraying unit, with a ½ h.p. motor was used ; but since the copper sulphate attacked the metal of the liquid reservoir, the compressor unit was mounted on a board, so that it could be used to spray liquid out of wooden barrels. Some of the bromeliads died within a few days, but the success of the operation was judged by inspections after 10 and 20 days.

To compare with this, another area of some 27 million sq. metres, containing 14 million bromeliads, was cleared by manual destruction of the plants. Comparing the two methods, the authors found that the copper sulphate method was 35 per cent. more efficient, in that 529 bromeliads were removed per man-day as compared with 345 by hand. The cost of the copper sulphate per square kilometre treated was, however, 29 per cent. greater. On the whole, the greater efficiency of the chemical compensates for its greater cost, except in difficult terrain, where the hand method is advisable. *J. R. Busvine*

VAN RIEL, J. Le comportement de *Roussettus leachi* vis-à-vis du *Plasmodium berghei.* [**Susceptibility of Bat** (*R. leachi*) **to Infection with** *P. berghei.*] *Ann. Inst. Pasteur.* 1950, Nov., v. 79, No. 5, 772–6, 2 figs.

The investigation reported in this paper was conducted with the object of testing the suitability of fruit bats (*Roussettus leachi*) as experimental hosts of *Plasmodium berghei.* These animals, which can easily be bred in captivity, were sent by air from Africa to Antwerp, where this study was carried out. Except in one case, the bats were free of their own malaria parasite (*P. roussetti*) which can readily be distinguished from *P. berghei.* Of the four bats used, two were splenectomized before inoculation (intraperitoneally) with the blood of a mouse infected with *P. berghei.* In these two bats the infection ran an acute course terminating fatally in ten and 26 days, whereas in the non-splenectomized bats the infection was transient, with spontaneous recovery in from two to four weeks. Among the animals susceptible to infection with *P. berghei* (tree-rat, cotton rat, black rat and white mouse), the reaction of the fruit bat is similar to that of the cotton rat. *C. A. Hoare*

RAMAKRISHNAN, S. P. & PRAKASH, S. **Susceptibility of the Indian Garden Squirrel** (*Sciurus palmarum*) **to** *Plasmodium berghei* **and its Assexual Periodicity.** [Correspondence.] *Nature.* 1951, Mar. 31, 533.

The authors, in the Malaria Institute of India in Delhi, have found the garden squirrel (*Sciurus palmarum*) to be susceptible to blood-induced infections of *Plasmodium berghei.* The infection was mild (unlike that in mice and some rats) and became chronic : periods of latency were followed by mild parasitic relapses. Typical " band " forms of parasites were common.

Smears were taken every four hours from 4 mice, 2 rats and 2 squirrels infected with *P. berghei* and the different stages of the parasites were enumerated by the method described by MULLIGAN [this *Bulletin*, 1935, v. 32, 797]. The periodicity of *P. berghei* in these animals was found to be 24 hours. Maturation of schizonts occurred daily between 6 a.m. and 10 a.m.

H. J. O'D. Burke-Gaffney

CORRADETTI, A. Particolari fenomeni immunitari nell'infezione da *Plasmodium berghei*. [**Immunity in Infections with** *P. berghei*.] *Riv. di Parassit.* Rome. 1950, Dec., v. 11, No. 4, 201–9. English summary.

Since the course of infection of rats with *Plasmodium berghei* shows some peculiarities as compared with malarial infection of man and other animals, the author undertook an experimental investigation of the behaviour of normal and splenectomized infected rats, with special reference to immunity. It was found that blood-induced infection with *P. berghei* does not produce relapses. Its duration varies between 28 and 50 days after the end of the primary attack, and terminates in recovery, with the disappearance of the parasites. The infection leads to a state of immunity, which is distinct from premunition and protects the host from reinfection with the homologous strain for at least 205 days after the primary attack. Since splenectomized rats can be successfully reinfected with the homologous strain, it is evident that this acquired immunity is maintained chiefly by the spleen. In such cases, a chronic infection is produced, with parasites in the peripheral circulation 220–255 days after reinoculation. However, even in splenectomized rats there is a certain degree of immune response, due to the reticulo-endothelial elements in other organs, which is sufficient to prevent death and sometimes even to protect against reinfection.

C. A. Hoare

MCGHEE, R. B. **The Adaptation of the Avian Malaria Parasite** *Plasmodium lophurae* **to a Continuous Existence in Infant Mice.** *J. Infect. Dis.* 1951, Jan.–Feb., v. 88, No. 1, 86–97, 4 figs. & 3 pls.

The author has already shown [this *Bulletin*, 1949, v. 46, 912] that *Plasmodium lophurae* can be made to survive for short periods in several types of mammalian blood. In this paper he describes the permanent establishment of the strain in infant mice. The parasite (originally isolated from the fireback pheasant) had been passed from ducklings to chick embryos and it was between the latter birds and less than day-old Swiss mice that the adaptive passages were made by intravenous inoculation of blood ; when infected mouse blood was passaged back to the chick, the corpuscles had to be washed to avoid toxic effects of the mouse plasma. In some mice the avian corpuscles were quickly destroyed, and the parasitaemia was negligible ; in others the avian corpuscles survived long enough for schizogony to be completed in them with successful invasion of mouse corpuscles ; in the last group so few of the avian corpuscles died, that the merozoites invaded these—their more natural habitat—rather than the mouse corpuscles, and as little adaptation followed as in the first group. Passage back to the embryo chick was carried out when parasites were on the point of disappearing from the mice ; the infection in the embryo had to be enhanced by several passages in embryos before being returned to mice. In this way, a strain was eventually obtained which, instead of being low grade and short-lived in mice, showed a one in five parasitaemia, long infections with relapses, and even an ability to infect older mice. In these later infections, the morphology of the parasite resembled that in the original birds ; in the earlier ones, various signs of degeneracy were present. The number of merozoites was, however,

always lower in mice—10 instead of 15—and gametocytes were never found. If the mouse-adapted strain was returned to the chick, gametocytes appeared normally in the first passage. The strain is now being maintained in 4-day mice with no apparent diminution in the viability of the parasite. [These experiments, though highly artificial, may well throw light on such fundamental problems as gametocyte and exo-erythrocytic production.] *P. C. C. Garnham*

GREENBERG, J., TREMBLEY, Helen L. & COATNEY, G. R. **Strain Differences in *Plasmodium gallinaceum* Brumpt. I. Differences in the Behavior of the Exoerythrocytic Forms of a Blood-Passaged (BI), and Sporozoite-Passaged (SP) Strain of *Plasmodium gallinaceum*.** *J. National Malaria Soc.* 1950, Dec., v. 9, No. 4, 320–26.

The behaviour of the exoerythrocytic forms of *Plasmodium gallinaceum* was studied in two strains of common origin, one of which (BI) was previously maintained by blood-passages, the other (SP) by sporozoite-passages through mosquitoes. For the experiments reported in this paper, two series of chicks were inoculated intramuscularly with suspensions of brain-tissue from donors harbouring parasites of the BI and SP strains respectively. In order to suppress any erythrocytic forms that might be present in the inoculum, the donors were treated throughout the course of infection with quinine sulphate (0·2 mgm. /gm. twice daily).

The BI strain produced in chicks infections with exoerythrocytic forms exclusively, while the SP strain produced in them infections with both erythrocytic and exoerythrocytic parasites. To test the possibility that the different patterns of infection were due to the method of passaging the two strains, the SP strain was blood-passaged, while the BI strain was mosquito-passaged. Although in the resulting infections with the SP strain both erythrocytic and exoerythrocytic parasites were present, when infected brain tissue was sub-inoculated, the recipient chicks did not develop exclusively exoerythrocytic infections. On the other hand, the BI strain, after mosquito-passages, produced only exoerythrocytic infections.

The two strains of *P. gallinaceum* thus differed in the pattern of the infection produced in chicks by the exoerythrocytic forms ; this difference remained constant and was not affected by the method of inoculation—whether by blood, by brain tissue, or by sporozoites. In the discussion of the results, it is suggested that BI represented an aberrant variant which had arisen by mutation from the parental strain common to both SP and BI. *C. A. Hoare*

BLACKWATER FEVER

RIGDON, R. H. & QUATTLEBAUM, J. E. **Observations on the Mechanism of Blackwater Fever. An Experimental Study in the Monkey.** *J. National Malaria Soc.* 1950, Dec., v. 9, No. 4, 332–40, 2 figs. [32 refs.]

" Hemoglobinuria frequently occurs as a terminal event in *M. mulatta* monkeys infected with *P. knowlesi*. In a few monkeys, hemoglobinuria has been observed to follow a rapid increase in the degree of parasitemia. Some of these latter animals have been treated with quinine and have survived the malarial infection. The hemoglobinuria subsided following therapy. Monkeys with malaria have been given adrenalin hydrochloride and hemoglobinuria occurred. Following treatment with quinine these monkeys recovered from both the hemoglobinuria and the acute malarial infection.

" It is suggested that hemoglobinuria in malaria is the result of the excessive destruction of erythrocytes by the plasmodia. The resulting pigments and debris are normally phagocytized by the cells of the reticulo-endothelial system. The spleen becomes enlarged because of its phagocytic activity. If destruction of the erythrocytes by the plasmodia continues at a rapid rate, the reticulo-endothelial system is unable to remove these pigments. Thus, a high plasma level results. When the concentration of pigments in the plasma is greater than the renal threshold value, the excess is filtered through the glomeruli into the urine, producing the condition recognized as hemoglobinuria.

" An attack of hemoglobinuria may be produced by contracting the spleen with adrenalin. The action of this drug is to ' squeeze out ' pigments and debris from the spleen into the circulation. The blood plasma concentration then will be increased over the normal renal threshold value with a resulting filtration of these pigments into the urine. To precipitate an attack of hemoglobinuria by adrenalin, it is necessary that many red cells should have been recently destroyed by the plasmodia and the spleen must be enlarged. The phenomenon of hemoglobinuria results from a disproportion between the rate of destruction of the erythrocytes and the ability of the reticulo-endothelial system to remove the pigments from the plasma. There is nothing in this study to suggest the presence of a ' hemolysin ' to account for the hemoglobinuria."

DACIE, J. V. **The Presence of Cold Haemolysins in Sera containing Cold Haemagglutinins.** *J. Path. & Bact.* 1950, Apr., v. 62, No. 2, 241–57. [25 refs.]

This work on haemolysins, which contains points of interest to readers of this *Bulletin* is fully abstracted in the *Bulletin of Hygiene*, 1951, v. 26, 207.

TRYPANOSOMIASIS

MONNET, A. & BAYLET, R. Aperçus sur l'état humoral des trypanosomés. [**Study of the Humoral State of Patients with Trypanosomiasis.**] *Méd. Trop.* Marseilles: 1950, Nov.–Dec., v. 10, No. 6, 1062–7.

Sleeping sickness cases were divided into three groups, *viz.*, old cases under treatment, new cases in the first stage, and new cases in the second stage of the disease (cerebrospinal fluid with over 5 cells per cmm.).

Tables are given showing the results of the serum reactions of Gate, Gros and Maclagan and the following points emerge : In untreated cases all tests tended to be positive, the more so as the disease advanced. Treated patients tended to return to normal. The Van Slyke test showed an increase of total γ globulins in the majority after a certain period, but tended to return to normal slowly under treatment. β globulins increased rapidly in all cases and fell as quickly under treatment. *C. C. Chesterman*

PILLE, G. Considérations sur le mode d'action des trypanocides. [**The Mode of Action of Trypanocides.**] *Méd. Trop.* Marseilles, 1950, May–June, v. 10, No. 3, 549–54. [14 refs.]

The author reviews the rationale of the steps that have been taken towards the discovery of compounds used for sleeping sickness. He begins by considering the two groups, (*a*) diamidines, and (*b*) the " thiolprive " substances,

which are the well-known long-established arsenicals and antimonials. He refers to studies by various authors, which have been duly abstracted in this *Bulletin*, on the metabolism of trypanosomes in relation to chemotherapeutic action, and then passes on to what this reviewer thinks might justly be called the Friedheim concept of combining an arsenical with B.A.L., as in Mel B. One would expect that the B.A.L. component of this drug-complex might short-circuit the arsenical's thiolprive properties (normally directed against the parasite's thiol groups), so that the compound's trypanocidal activity would be impaired. But these B.A.L.-combined compounds nevertheless act very rapidly on trypanosomes in the blood. The author discusses the question whether they act against the trypanosome as single molecules, or whether activity is attributable only to the arsenoxide moiety after it has dissociated from the B.A.L.

The orientation of chemotherapeutic theory towards inhibition of specific essential enzyme systems will probably lead us further and further away from the classical and relatively toxic agents of the past, and towards types of compound with a greater margin of safety. Perhaps a glimpse towards the trypanocide of the future is afforded by the demonstration of antitrypanosomal effect in preparations obtained from the eucalyptus tree ? [SAUTET & RANQUE, *Médecine Tropicale*, 1949, v. 9, 400.] *E. M. Lourie*

KLEINSCHMIDT, A. & KINDER, E. Elektronenoptische Befunde an Rattentrypanosomen. [**Electron Microscope Observations on Rat-Trypanosomes.**] *Zent. f. Bakt.* I. Abt. Orig. 1950, Nov. 25, v. 156, No. 3, 219–24, 7 figs. on 1 folding pl. [12 refs.]

The authors describe the results of cytological studies on *Trypanosoma lewisi* carried out with the aid of the electron microscope, using different methods of preparation.

Infected rat blood can be freed of erythrocytes by centrifugation. The trypanosomes are then washed in buffered saline containing 0·1 per cent. glucose, and a drop of dilute suspension is placed on the objective grid and dried with filter paper. In this preparation the trypanosomes remain opaque and do not show much inner or surface structure. However, these are revealed in a conventional thin blood film, which is washed twice in saline, then shadowed with gold *in vacuo* and afterwards covered with dilute collodion. After prolonged immersion in distilled water the collodion film can be detached from the slide together with the layer of gold adhering to it. The resulting specimens show a longitudinal striation in the flagellum, the free portion of which was in some cases split into about 8 separate fibrils, and the surface of the body or periplast has the appearance of a finely striated membrane. However, the above preparation was frequently damaged by the presence of numerous salt crystals. This defect was successfully eliminated in an agar preparation. A hot 4 per cent. solution of purified agar was spread in a thin film on a slide and after it had hardened a suspension of trypanosomes was evenly distributed on its surface. The preparation was then placed in a moist chamber in the refrigerator for 2 hours, after which it was rapidly dried at room temperature. Finally, a collodion impression, shadowed with gold, was made. This preparation clearly reveals the nucleus, kinetoplast, flagellum and other structures. It also shows that the striation of the periplast is due to fibrils arranged in spirals on the surface of the body.

The present finding confirms the presence of a surface striation in *T. lewisi* which had previously been detected with the light microscope. The electron microscope shows that this striation is due to the presence in the periplast

of fibrils measuring 60 mμ in width, the spiral arrangement of which accounts for the " boring " movements of the trypanosome.

The paper is illustrated with 7 electron photomicrographs. *C. A. Hoare*

LEISHMANIASIS

CONRAD, A. H., Jr., MANSON, R. C. & PETERKIN, G. A. G. **Cutaneous Leishmaniasis. Report of Cases occurring in Great Britain and the United States.** *Arch. Dermat. & Syph.* 1950, Oct., v. 62, No. 4, 502–9, 4 figs.

This is an account of oriental sore, based on a limited wartime experience in countries where the disease is endemic and on the observation in non-endemic areas of a few cases of men who had acquired the infection during foreign service. Four cases are described in some detail ; in two of them, the diagnosis was first made in the United States and in Great Britain, respectively, and each had a single lesion on the face that responded well to treatment, a course of stibophen *plus* 3 X-ray exposures (100 *r*) and 3 exposures of 150 *r* each at intervals of a fortnight, respectively.

Treatment is discussed in some detail. For a small number of lesions infiltration by berberine sulphate, 1·5 to 5·0 ml. of a 1 per cent. solution dissolved in 1 per cent. procaine hydrochloride, or X-ray exposures as above, are recommended, or alternatively, where the lesions are not on the face, either vegetable charcoal, 20 per cent. in nitric acid, or carbon dioxide snow applications.

For cases with numerous lesions, stibophen intramuscularly up to 5 ml. every five to seven days is recommended. [This is surely unnecessarily wide spacing of doses.] *L. E. Napier*

CORDERO, F. A. **American Leishmaniasis. Report of a Case with Unusual Mucocutaneous Lesions.** *Arch. Dermat. & Syph.* 1950, Sept., v. 62, No. 3, 425–30, 3 figs.

This is the report of a case of South American mucocutaneous leishmaniasis in a chicle-gum worker in Guatemala ; the principle features are the extensiveness of the lesions and the involvement of the rectal mucosa.

The first lesions appeared on the border of the right pinna three to four weeks after the man started work ; further lesions appeared along the border until the whole was involved. After temporary improvement under local treatment and rest, the man returned to work, but eight weeks after his return new lesions appeared on the left arm and buttock, then on the " lower part of the back ", right buttock and thigh. Finally, when he first came into hospital about a year after the first lesions appeared, he had lesions in all the above places, but the lesion on the buttock had enlarged from a small papule to a deep ulcerated area involving most of the buttock and extending into the anal orifice, beyond which there was an ulcer about 2 cm. in diameter in the rectal mucosa, and there were in addition papular lesions in the groin, on the penis and on the scrotum. The author discusses the question whether the subsequently developing lesions were the result of auto-inoculation or of re-infection ; he favours the latter view since the man " had been exposed to multiple mosquito [*sic*] bites at different periods."

Stibophen in doses from 1·5 to 5·0 ml. of a 6·3 per cent. solution up to a total of 80 ml. was given intramuscularly. The lesions all healed rapidly.

L. E. Napier

FEVERS OF THE TYPHUS GROUP

KITAOKA, M. & SHISHIDO, A. **Studies on Rickettsial Toxin. Simplified Potency-Test of Typhus Vaccine in Mice by Direct Challenge of the Toxin.** *Japanese Med. J.* 1950, Feb., v. 3, No. 1, 1–10, 4 figs.

The author describes a new method of testing the potency of typhus vaccines ; he claims that it has great advantages in simplicity, rapidity and cheapness. Groups of mice weighing 12 gm. are inoculated intraperitoneally with doses of 1·0 cc. of the following dilutions of the vaccine : 1–10 ; 1–100 ; 1–500 and 1–1,000. The mice of each group are challenged 5 or 6 days later, some with 2 LD_{50} and an equal number with 3 LD_{50} doses of standardized toxin. The employment of two different doses is intended as a safeguard against the loss of toxicity that sometimes occurs even within a day after standardization.

The results agreed closely with those obtained by the usual methods.

For details the original paper must be consulted. *John W. D. Megaw*

SCHUBERT, J. H., STANFORD, Sara M. & TIFFANY, E. J. **Comparative Evaluation of several Complement Fixation Techniques for Laboratory Diagnosis of the Rickettsioses.** *J. Lab. & Clin. Med.* 1951, Mar., v. 37, No. 3, 388–93.

The authors have carried out a series of comparative tests of the results obtained with complement-fixation tests according to the following methods : Bengtson's original method (B.) ; Bengtson's modified method (M.B.) ; Kolmer's modified method (M.K.), the Hamilton Laboratory original method (H.L.) and the Hamilton Laboratory modified method (M.H.L.).

The antigens employed were the commercially available strains of murine typhus, rickettsialpox, Rocky Mountain spotted fever and Q fever.

The following table shows the relative sensitiveness and specificity of each method, judged by the number of cases of failure to react (false negatives) and of false positives observed in a group of 48 human sera which had been found to react with murine typhus antigen by any one of the methods employed.

	B.	M.B.	M.K.	H.L.	M.H.L.
Failed to react	9	6	2	1	0
False positives with :—					
(1) Rocky Mountain spotted fever	0	0	2	3	7
(2) Rickettsialpox	0	1	2	3	10
(3) Q fever	0	0	0	0	1

The sensitiveness is therefore in inverse ratio to the specificity of the tests but the above figures give an exaggerated idea of the differences. In a total of 90 positive sera made up of 48 human and 29 rat sera positive with murine antigen and 13 human sera positive with Rocky Mountain spotted fever (R.M.S.F.) antigen the percentages of positive reactions were :—

	B.	M.B.	M.K.	H.L.	M.H.L.
Per cent. sensitive	85·6	90·0	94·5	95·6	97·8
In a total of 484 negative serum tests the percentages with no false positives were	100	99·8	98·9	98·4	94·8

Among 29 rat sera positive for murine typhus there were no false negatives with any of the methods.

In the tests of 13 sera positive with R.M.S.F. antigen the reactions with rickettsialpox antigen did not differ significantly from those obtained with R.M.S.F. antigen.

The merits of the various methods are discussed and it is concluded that with the exception of the M.H.L. method all are reliable for diagnosis when two or more tests are carried out at suitable intervals. The B. method may be preferable in places where all the four rickettsial fevers are prevalent. The M.K. method has the advantage that the technique is familiar to a large number of workers in the public health laboratories. The B. and M.B. methods yield results within 24 hours.

The authors discourage the prevalent idea that a diagnosis can safely be based on the result of a single test at " diagnostic titre ". *John W. D. Megaw*

Fox, I. **Relative and Seasonal Abundance of the Common Rat Ectoparasites of San Juan, Puerto Rico.** *J. Parasitology.* 1951, Feb., v. 37, No. 1, 85–95, 6 figs. [16 refs.]

Most of the cases of murine typhus fever in Porto Rico occur in San Juan in May, June, July and August.

Two separate surveys of the rats and their ectoparasites were therefore made in the area. The rats were *Rattus rattus* and *Rattus norvegicus* and their parasites were *Xenopsylla cheopis, Echidnophaga gallinacea, Polyplax spinulosa, Bdellonyssus* [*Liponyssus*] *bacoti, Laelaps nuttalli* and *Ornithodorus puertoricensis,* of which the first four are known to be experimental transmitters of rodent typhus. One survey was made between April 1946 and February 1947, in the restaurants of the business area of San Juan. Of the total of 387 rats, 90 per cent. were *Rattus rattus* and 63 per cent. of them were infested with *Xenopsylla cheopis* at a mean rate of 2·2 fleas per rat. No parasite showed a seasonal distribution coinciding with the reported cases of typhus, but the number of rats collected was perhaps too small and the period of the survey too short.

The other survey extended through the years 1946, 1947 and 1948, in the poorer districts of the residential area. Here, 938 rats were caught, of which 90 per cent. were *Rattus norvegicus.* The data concerning the ectoparasites appear to show that *Xenopsylla cheopis* and *Ornithodorus puertoricensis* (particularly the former) meet the requirements for vectors more than the others.

All relevant data are presented in graphs.

[For a similar survey of *Rhipicephalus sanguineus* on rats in the same areas see this *Bulletin*, 1951, v. 48, 247.] *H. S. Leeson*

See also p. 680, LE GAC, **Découverte d'acariens du genre *Thrombicula* en Oubangui-Chari (A.E.F.).**

FRANKLIN, J., WASSERMAN, E. & FULLER, H. S. **Rickettsialpox in Boston. Report of a Case.** *New England J. of Med.* 1951, Apr. 5, v. 244, No. 14, 509–11.

" The second naturally occurring case of rickettsialpox diagnosed in Massachusetts is described.

" The diagnosis was established by the clinical and laboratory findings, including a significantly elevated complement-fixation titer.

" The patient recovered promptly without specific treatment.

" This case probably indicates a second focus of natural infection within the city of Boston."

[See also this *Bulletin*, 1951, v. 48, 546.]

GIROUD, P., LE GAC, P., BRIZARD, H. & LAURENT, G. Comportment sérologique en Oubangui-Chari de l'homme et des animaux domestiques vis-à-vis de la fièvre Q. [**Serological Reactions to Q Fever in Persons and Domestic Animals in Oubangui-Chari (French Equatorial Africa).**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 1/2, 51–4.

With microscopical rickettsia-agglutination tests the authors found that 29 Africans out of 315 in Oubangui Chari gave positive reactions to *R. burneti* at titres of 1–20 to 1–320.

Among domestic animals positive reactions at titres of 1–80 or over were found in 21 of 49 cattle ; in 9 of 90 sheep, and in 3 of 91 goats.

John W. D. Megaw

CLARK, W. H., LENNETTE, E. H. & MEIKLEJOHN, G. **Q Fever in California. III. Aureomycin in the Therapy of Q Fever.** *Arch. Intern. Med.* 1951, Feb., v. 87, No. 2, 204–17, 5 figs.

Aureomycin was given to 45 patients suffering from Q fever ; the results are compared with those observed in a previous group of 25 patients who had been treated with penicillin. Treatment was oral in 25 cases, oral and intravenous in 10, oral and intramuscular in 7, intramuscular alone in 2 and intravenous alone in 1.

The oral dosage ranged from 1·0 to 5·0 gm. daily for an average period of 5 days. At first the routine daily dose was 2·0 gm. but later it was 4·0 gm. In one case 89 gm. was given in 24 days. The intravenous dosage was 200 to 300 mgm. daily, given in two or three doses. Intramuscular treatment was soon abandoned because of severe local pain and inflammation.

The median duration of the fever after the first dose was 3 days, in the penicillin group it was 8 days. The average duration is regarded as less significant ; it was 6 days in the aureomycin group and 9 days in the penicillin group.

The authors regard aureomycin as having been useful, but they state that in 4 cases there was little or no improvement, and in 9 others the patients did not become afebrile till more than 5 days after the first dose was given.

About 60 per cent. of the patients complained of varying degrees of nausea during oral treatment ; 2 patients had soreness of the scrotum ; one of these had also soreness of the mouth, the other had a few pruritic papules over the shoulders.

Rickettsiae were isolated from 8 out of 9 samples of blood taken during the first three days of treatment from 5 patients. One patient among 4 who were tested 10 to 18 days after the first dose had rickettsiae in the blood.

Obviously some strains of the rickettsiae are resistant to the drug.

John W. D. Megaw

STOENNER, H. G. **Experimental Q Fever in Cattle—Epizoötiologic Aspects.** *J. Amer. Vet. Med. Ass.* 1951, Mar., v. 118, No. 888, 170–74. [17 refs.]

In attempts to cause experimental infection of cattle with Q fever the teats of five cows were dipped into infected milk five times weekly before milking for a period of 10 to 18 weeks, and again after milking for a further period of 19½ weeks, but without result.

Attempts to infect cows [number not stated] by the bites of ticks (*Otobius megnini*) collected from cattle of an infected herd gave negative results except that one cow responded with a complement-fixation reaction, but rickettsiae could not be recovered from the blood or milk.

Cultures of rickettsiae dropped on the conjunctivae of two cows failed to cause infection.

Intradermal inoculation with rickettsial cultures caused local oedema and necrosis in two calves whose blood yielded rickettsiae for about five days afterwards and the calves became serologically positive.

A pregnant lactating cow, inoculated intradermally, developed a local skin lesion and high fever ; rickettsiae were isolated from the blood for five days and from the milk of all four teats for 15 days. Abortion followed on the 7th day and the placenta was found to be infected.

A pregnant cow was caused to inhale a nebulized culture of rickettsiae ; the complement-fixation test became positive on the 13th day, but later the reaction became negative. When the cow gave birth to a healthy calf the placenta was found to be infected and vaginal washings remained infected for a month ; there were no signs of illness in the cow.

A non-pregnant lactating cow was inoculated in the same way ; the fixation test became positive on the 12th day and remained positive till the 47th day ; the milk, urine, vaginal washings and blood remained free from infection.

The results observed suggested an analogy with brucellosis in which also infection tends to be localized in the uterus, placenta or mammary gland, and young animals are relatively resistant to infection. *John W. D. Megaw*

YELLOW FEVER

Gillett, J. D., Ross, R. W., Dick, G. W. A., Haddow, A. J. & Hewitt, L. E. **Experiments to test the possibility of Transovarial Transmission of Yellow Fever Virus in the Mosquito** *Aëdes* (*Stegomyia*) *africanus* **Theobald.** *Ann. Trop. Med. & Parasit.* 1950, Dec., v. 44, No. 4, 342–50. [26 refs.]

In order to clear the ground before beginning the search for any additional cycle, the authors performed three experiments with *Aëdes africanus* to test the hypothesis that the yellow fever virus passes transovarially from one generation to the next.

Experiments are described in which 246 wild-caught female *Aëdes africanus* were fed on three rhesus monkeys which had been inoculated with the virus ; 108 of these mosquitoes laid 164 batches of eggs and these eggs were reared through to adults. Tests had shown that the yellow fever virus was present in 36 of the parents. Of the 1,892 adults which were produced, 610 of them were from the infected parents. Most of the female progeny were offered a blood meal during the first week of adult life and after 18 days they were inoculated into mice in groups or singly. No yellow fever virus was recovered from the F_1 adults.

The authors believe that the number of infected mosquitoes used in these experiments and the number of F_1 adults derived from them are sufficient to justify the conclusion that transovarial transmission of yellow fever virus probably never occurs in *Aëdes africanus*. *H. S. Leeson*

Ross, R. W. & Gillett, J. D. **The Cyclical Transmission of Yellow Fever Virus through the Grivet Monkey,** *Cercopithecus aethiops centralis* **Neumann, and the Mosquito** *Aëdes* (*Stegomyia*) *africanus* **Theobald.** *Ann. Trop. Med. & Parasit.* 1950, Dec., v. 44, No. 4, 351–6, 1 fig. [14 refs.]

Batches of *Aëdes aegypti* were fed on rhesus monkeys four days after their inoculation with the virus of yellow fever. The mosquitoes were kept for 18 and 19 days at 30°C. and were then fed on fresh non-immune rhesus monkeys.

Fresh batches of *Aëdes aegypti* and *Aëdes africanus* were fed on the rhesus monkeys on the 3rd, 4th and 5th days and those batches which had fed when the virus was circulating at high titre were kept for 39 and 23 days respectively and were then allowed to engorge on non-immune grivet monkeys.

Two series of cyclical transmissions were then begun with grivet monkeys and *Aëdes africanus* alone. With the wild-caught *Aëdes africanus* and three monkeys, two complete cycles were achieved, the virus being kept alive for 65 days ; this experiment ended because no more mosquitoes were available. With the laboratory-bred *Aëdes africanus* and four monkeys, three complete cycles were achieved, the virus living for 122 days ; this experiment terminated because a suitable non-immune monkey was not available. Both these difficulties must occur in nature.

This work reproduces in the laboratory the cycle which is believed to occur in the extensive forests of Bwamba, with wild monkeys and *Aëdes africanus* ; but it would seem that the cycle, without any additional factors, would be inadequate to maintain the virus in small isolated forests. *H. S. Leeson*

See also p. 677, GIAQUINTO-MIRA, **Notes on the Geographical Distribution and Biology of " Anophelinea " and " Culicinae " in Ethiopia.**

See also p. 617, FLOCH, **Les résultats de la " dédétisation " en Guyane française : destruction de " Aedes aegypti ", et réduction spectaculaire du paludisme.**

RABIES

VILLANI, G. & FALCONE, F. Acidi nucleinici e corpi del negri. [**Nucleinic Acid and Negri Bodies.**] *Giorn. di Batteriol. e Immunol.* 1950, Mar.–Apr., v. 41, Nos. 9/10, 458–67, 5 figs. on 2 pls. [14 refs.] English summary.

SATTA, E. Metodo rapido di fissazione e inclusione per l'accertamento istologico della rabbia. [**Rapid Method of Fixation and Embedding for the Histological Diagnosis of Rabies.**] *Giorn. di Batteriol. e Immunol.* 1949, Nov., v. 41, No. 5, 257–61. English summary.

In this method the author employs Carnoy's fluid as a fixative. Small pieces of hippocampus major are placed in the fixing mixture (absolute ethyl alcohol, 6 volumes ; chloroform, 3 volumes ; glacial acetic acid, 1 volume) for 15–30 minutes. This is followed by two baths in absolute alcohol of 30 minutes each, xylol until clear (about 30 minutes) and two baths in paraffin. The soft paraffin bath is given for 30 minutes and the hard paraffin for 30–45 minutes. The sections are prepared in the usual manner and stained by Mann's method.

It is stated that differentiation is good and that Negri bodies stand out clearly as dark red structures. It is also claimed that verification of rabies may be made by this method in less than 4 hours : and that the technique has not the disadvantages of other so-called rapid methods.

H. J. O'D. Burke-Gaffney

LATIMER, F. R., WEBSTER, J. E. & GURDJIAN, E. S. **Neurological Complications of Rabies Vaccine : Report of Two Cases.** *Arch. Neurology & Psychiatry.* 1951, Jan., v. 65, 16. [Summary taken from *J. Amer. Med. Ass.*, 1951, Mar. 24, v. 145, No. 12, 929.]

Two patients are described in whom neuroparalytic accidents developed in the course of the prophylactic use of rabies vaccine. The first patient was a youth aged 17, the second was a man aged 25. Both patients had had previous

antirabies treatment in childhood. In the first of these two cases thoracic transverse myelitis appeared after the tenth inoculation, with subsequent recovery. In the second patient a systemic reaction followed the first injection and encephalomyelitis with intercostal paralysis developed after the eighth inoculation, the process terminating in death. Pathological changes included adventitial infiltration of cerebral vessels with round cells, perivascular microglial reaction and infiltration of the vagus nerve with polymorphonuclear leukocytes. The incidence of neuroparalytic accidents complicating the use of rabies vaccine has been variously reported by American authors as ranging from one in 280 treated patients to one in 8,287 patients. On the other hand, world-wide statistics place the incidence at 1 : 5,814 in a series of 1,290,758 treated patients, with a mortality rate of 25 per cent. In 22 cases of neurological reactions to rabies vaccine collected from the literature the males outnumbered the females by more than two to one. The mortality rate in this group was 40 per cent.

PLAGUE

YAOI, H., YOSHINO, K. & IKEGAMI, M. **Studies on the Semi-Synthetic Media for the *Pasteurella pestis*. 1st Report : On the Nutritional Requirement of *Past. pestis*.** *Japanese Med. J.* 1950, Feb., v. 3, No. 1, 11–15.

The authors describe studies on the nutritional requirements of *Pasteurella pestis* on the lines of the work of RAO in 1939 and 1940 [this *Bulletin*, 1940, v. 37, 826].

A basic medium composed of hydrolysed casein, certain inorganic salts and cystine was prepared ; subcultures were made every 5 to 7 days and it was found that non-virulent strains continued to grow at the same rate in successive subcultures, whereas there was a progressive retardation of the rate of growth of virulent cultures.

With organisms of the 6th or 7th subculture of virulent strains the rate of growth was promoted by the addition to the basic medium of haematin, cozymase, thiamin, pyridoxin or yeast dialysate. Nicotinic acid promoted growth, but to a less degree than the other substances. *John W. D. Megaw*

NÉEL, R. Le comportement du pouvoir pathogène de *Pasteurella pestis* au cours de la peste pulmonaire primitive experimentale du cobaye, traitée par la streptomycine. [**The Effect of Treatment by Streptomycin on the Virulence of *P. pestis* in Experimental Pneumonic Plague of Guineapigs.**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 1/2, 69–76. [10 refs.]

In view of the evidence produced by ESTRADE and by WAGLE *et al.* [this *Bulletin*, 1949, v. 46, 358] that streptomycin has a pronounced curative action in pneumonic plague the author was induced to test the effect of the drug on the experimentally produced disease in guineapigs. He inoculated the animals by the intratracheal route with virulent cultures of *Pasteurella pestis* in doses which were lethal to untreated controls in 68 to 75 hours. Treatment was not started till 48 hours after the inoculation ; the drug was given in doses of 25 mgm. twice daily to a total of 250 mgm. ; some of the guineapigs were sacrificed before the end of the time to observe the effect of the treatment at different stages.

Apart from the strikingly curative action of the drug there was a rapid reduction in the number of visible bacilli and a progressive fall to zero of their virulence to mice before they had ceased to be viable in cultures. These findings suggest that streptomycin is likely to cause a great reduction in the length of time that patients suffering from pneumonic plague remain infective.

[The findings also suggest that a course of streptomycin may have considerable protective value for persons exposed to great risk of infection through contact with persons suffering from pneumonic plague.]

John W. D. Megaw

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

DESCHIENS, R. & LAMY, L. L'amibiase dans les territoires de l'Union française. Ses relations avec l'amibiase métropolitaine. [**The Relation between Amoebiasis in the French Union Territories and that in Metropolitan France.**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 1/2, 24–36, 1 fig.

Amoebiasis is electively exotic in endemicity, but is also common in the temperate climates. It therefore is of interest throughout the whole of the French Union, metropolitan, subtropical and tropical. Its incidence in various areas has been studied in relation to the size of the indigenous population, the general morbidity, and the morbidity due to amoebiasis. The facts are set forth in great detail in tables and in block graphs. The present principal foci of endemicity of amoebiasis in the French Union are Cochin-China (with an infection rate of 25·7 per cent.), Morocco (21·7 per cent.), Niger (20 per cent.), Tonking (15 per cent.) and New Caledonia (5·9 per cent.). While metropolitan France is constantly subject to the reintroduction of the infection from these areas of high endemicity, the position in the French Union as a whole is quite satisfactory in view of the vigorous, persevering and effective struggle being waged against the infection in these areas. *A. R. D. Adams*

EVERRITT, Martha G. **The Relationship of Population Growth to** *in Vitro* **Encystation of** *Endamoeba histolytica*. *J. Parasitology*. 1950, Dec., v. 36, No. 6, Sect. 1, 586–94, 2 figs. [10 refs.]

Experiments were carried out to determine the effect of multiplication of *Entamoeba histolytica* upon its encystation in cultures. Encystation was induced in two strains by first cultivating the amoebae in starch-free medium and then subinoculating into Balamuth's medium containing 0·5 per cent. liver extract and starch powder. The number of amoebae in the inoculum, the amount of medium and the period of cultivation varied according to the conditions of the experiment. A comparison of cultures of two strains, started with inocula ranging from 100 to 50,000 amoebae, indicated that the most suitable time for examination was after 48 hours, when a definite correlation was observed between the density of the population and the percentage of encystation. When inoculated with upwards of 5,000 amoebae, in one strain (23) the populations exceeded 2 million, with about 40 per cent. cysts, while the other strain (22) reached less than 1 million, with about 10 per cent. cysts. With inocula below 5,000 amoebae, the populations were small and cysts were scanty or absent.

Further observations (continued with a single strain) showed that the degree of encystation also depended on whether or not the culture was agitated. A series of tubes were inoculated with 25,000 amoebae each, and some of them were stirred after varying periods of incubation (up to 48 hours) while others were left alone. It was shown that agitation inhibited cyst-formation, whereas in undisturbed cultures there was an increase in the percentage of cysts which was proportional to the logarithmic increase in the size of population.

By cultivating the amoebae in containers of different sizes and shapes (tubes and flasks), it was found that the increase of the population was proportional to the horizontal surface available to the amoebae, and that the size of the population necessary to promote encystation also depended on this area.

The correlation between the density of the amoebic population and the degree of cyst-formation, established in these observations, is attributed either to the effect of " crowding " of the organisms or to the accumulation of products of metabolism from the amoebae. *C. A. Hoare*

ISHINO, K. **Studies on the Influences of Intestinal Flora upon the Excystation of** *Entamoeba histolytica in Vitro.* **III. On the Influences of Pure Strain of Bacteria upon the Excystation of** *Entamoeba histolytica.* *Kitasato Arch. Exper. Med.* 1950, Oct., v. 23, No. 2, 135–9.

Having confirmed the indispensability of the intestinal flora for the excystation of *Entamoeba histolytica* in culture [this *Bulletin*, 1951, v. 48, 362], the author carried out experiments with pure strains of bacteria to determine their individual power to induce hatching of the cysts. For this purpose, a number of Gram-negative bacilli (*Bact. coli* and a coliform organism described as *E. metacoli*) and Gram-positive cocci, isolated from the patients' stools, were grown separately with the disinfected cysts isolated from human cases. Excystation took place in cultures containing *Bact. coli* or *E. metacoli* but not in those with coccus or *Bact. aerogenes*. However, it occurred more readily in the presence of a mixed bacterial flora than with a single strain of bacteria, while the addition of a portion of stool provided a further stimulus.

C. A. Hoare

ISHINO, K. **Studies on the Influences of Intestinal Flora upon the Excystation of** *Entamoeba histolytica in Vitro.* **IV. Influences of Pathogenic Bacteria upon Excystation ; General Discussion and Conclusion.** *Kitasato Arch. Exper. Med.* 1950, Oct., v. 23, No. 2, 141–4.

Continuing his previous investigations, the author tested the effect of various pathogenic bacteria upon excystation of *Entamoeba histolytica*. Pure cultures of *Shigella dysenteriae*, *Sh. flexneri*, *Salmonella typhi*, *Salm. cholerae suis*, *Salm. enteridis*, *Salm. paratyphi A* and *B* were added to culture tubes containing the amoebic cysts freed of bacteria. Since there was no growth of amoebae in any of these cultures after 4 days, it is concluded that none of these bacteria is capable of promoting excystation.

In a discussion that follows, the author considers the views of other workers regarding the factors responsible for the excystation of *E. histolytica* in cultures. From his own investigations [this *Bulletin*, above and 1951, v. 48, 362] it was concluded that of all the bacteria tested, the only species which favour the hatching of the amoebic cysts are *Bact. coli* and *Bact. metacoli*. The time required and the rate of excystation vary both with the strain of amoeba and with the accompanying bacteria. As regards the exact factors which promote excystation, it is thought that they are due to changes in the medium induced by the presence of certain living bacteria. It has been demonstrated that the filtrate of culture media, in which there was abundant growth of amoebae and bacteria, cannot induce excystation. Finally, the author suggests that the two coliform bacilli might play an important rôle in the course of the amoebic infection in man. *C. A. Hoare*

MORETTI, G. F. & CATROS, P. Le potentiel d'oxydo-réduction dans les cultures d'*Entamoeba dysenteriae*. [**The Oxidation-Reduction Potential in Cultures of** *E. histolytica*.] *C. R. Soc. Biol.* 1950, Nov., v. 144, Nos. 21/22, 1500–503, 4 figs.

Work on the oxidation-reduction potentials in cultures of *E. histolytica* has previously been reported by CHANG [this *Bulletin*, 1947, v. 44, 83] and by other authors. The present authors have made similar observations on two strains of the parasite, one of which had been subcultured 280 times (D) and on another which had been recently isolated from a patient with amoebiasis (E). A medium modified from that of DOBELL & LAIDLAW [this *Bulletin*, 1927, v. 24, 363] was used. The tubes were capped with rubber and had three holes for the insertion of the platinum, glass and calomel electrodes for measurement of *p*H and Eh values at 37°C. As soon as the tubes were inoculated with culture material there was a rapid fall in the Eh values, which reached a minimum of −130 mv. in about 15 hours (strain D) and −230 mv. (strain E.). A slight rise in Eh values to −100 and −160 mv. respectively followed till the 30th hour. These values were maintained till approximately the 96th hour of culture and then began to drop on death of the amoebae. The bacterial flora accompanying the D strain gave a similar curve alone, but of value about 60 mv. lower. To test whether the bacteria were providing a suitable oxidation-reduction potential 4 culture tubes were used, to which 500 units of penicillin and 100 units of streptomycin per ml. of medium were added respectively at the time when the inoculum was added, and also 24 and 48 hours later, while the remaining tube served as control. The growth of amoebae was also correlated with oxidation-reduction potentials at various time intervals. The best growth occurred between the 24th and 96th hours of culture, during which time *p*H values varied from one culture to another. The author concluded that the most favourable results were obtained with a low oxidation-reduction potential lying between −100 and −160 mv. The more virulent the strain the lower was this value. The bacteria, as shown by experiments with the antibiotics, provided a suitable reduction potential, but overgrowth was harmful. When an attempt is made to grow *E. histolytica* in absence of bacteria, suitable anaerobic conditions as indicated by Eh values must be attained. *J. D. Fulton*

JACOBS, L. **Oxidation-Reduction Potentials in the Cultivation of** *Endamoeba histolytica*. *Amer. J. Trop. Med.* 1950, Nov., v. 30, No. 6, 803–15, 5 figs. [21 refs.

The importance of bacteria in maintaining cultures of *E. histolytica* is well recognized, but their function in aiding growth is still by no means clear. The production of suitable oxidation-reduction potentials has been put forward as one explanation and a number of investigations in this field have been reported during the last few years. The author gives a brief and lucid account of the theory and method of measuring these potentials (Eh) and their significance in biology is indicated. The present investigation has furnished data on Eh values in bacterial cultures which influence the growth of *E. histolytica* to a different extent, in order to find if there was any correlation between these values, which are partly determined by the type of bacteria present, and the rate of multiplication of amoebae. For this purpose Eh and *p*H values were determined in cultures on Locke-egg-rice medium exposed to air. The latter values showed considerable constancy but there were wide variations in the Eh values in cultures over a period of days. The lowest values obtained with *Bacterium coronafaciens*, *B. subtilis*, *Strep. haemolyticus*, organism "t" and *Clostridium welchii* approximated respectively to −114, −120, −250, −350, and

—300 mv. When similar measurements were made in the presence of *E. histolytica* the values did not change markedly. At the same time counts were made of the amoebic population. In the case of amoebae growing in association with organism " t " the most rapid multiplication occurred between 24 and 48 hours after inoculation, at which time the Eh values were higher than when bacteria only were present. In cultures with *Clostridium welchii* somewhat similar results were obtained but the presence of the three other bacterial species mentioned were associated with poor growth of the amoebae. Correlation between Eh values of the cultures and amoebic growth was not apparent. It could be said that *E. histolytica* grew within a wide range of oxidation-reduction potentials which are controlled by a number of factors and a wide variety of substrates can produce the same Eh values. Whether the value is important *per se* cannot be easily decided in view of the number of factors which influence it. The author concludes that *E. histolytica* can multiply under less exacting conditions of anaerobiosis than have previously been deemed necessary for good growth. While there is lack of correlation between oxidation-reduction potentials and growth of amoebae in culture, association of amoebae with those bacteria which give low Eh values gives rise to better growth. It is possible that something which organism " t " and *Clostridium welchii* have in common exercises a favourable influence on the growth of *E. histolytica*.

J. D. Fulton

INOKI, S., NAGAI, A., KITAMURA, T., TAKADA, S. & NAKABAYASHI, T. **Studies on the New Culture Methods of** *Endamoeba histolytica*. *Med. J. Osaka Univ.* 1950, Sept., v. 2, No. 1, 53–72, 5 figs. [26 refs.]

The authors describe a number of new media which they have devised in an endeavour to obtain more reliable methods of cultivating *Entamoeba histolytica* for diagnostic purposes and for tests of amoebicidal drugs.

They started with Tanabe-Chiba's diphasic medium, in which the slant consists of 1 per cent. agar in Ringer's solution plus 0·1 per cent. asparagine, with an overlay of 5 per cent. inactivated rabbit serum in Ringer's solution. As this medium proved to be inadequate, attempts were made to improve it by substituting phosphate buffer saline for Ringer's solution, but the results were only slightly better, subcultures being required every fourth day instead of daily, as in the original medium. Much more abundant growth of amoebae was obtained with " Whole Blood Medium No. 1 ", which was produced by substituting the serum in the overlay of the preceding medium by whole human (or rabbit) blood, the coagulation of which was prevented by heating the fluid at 56°C. for 30 minutes or by using sodium citrate instead of sodium chloride in the overlay. In this medium subcultures could be made every 4th or even 10th day. Much more rapid and abundant growth of amoebae was obtained in " Whole Blood Medium No. 2 " : this is a modification of the preceding medium, in which the solid portion is replaced by Loeffler's serum or by coagulated human or horse serum-broth (without dextrose). Though in this medium the density of amoebae reaches its maximum in 2 days, they also die out sooner, therefore it is less suitable for the preservation of strains than the preceding medium. Another peculiarity of " W.B. No. 2 " medium is that trophic amoebae grown in it become more resistant to low temperatures, in that they can survive for 7 days at room temperature (20°C.) and for 10 days at 7°C. The properties of this medium remain unaffected by autoclaving for 20 minutes at 20 lb.

For testing drugs, the authors have devised an all-fluid medium, made up of the phosphate buffer saline plus whole blood mentioned above, with the addition of 0·1 per cent. asparagine. This medium is said to be superior to any other

fluid medium hitherto described. In all the above-mentioned media the addition of rice flour is indispensable. Finally, it was found that 0·1 per cent. sodium aspartate, 0·1 per cent. sodium glutamite, and 1 per cent. succinic acid could be used as substitutes for asparagine in the preparation of some of the new media. *C. A. Hoare*

BALAMUTH, W. & BRENT, M. M. **Biological Studies on *Entamoeba histolytica*. IV. Direct Action of the Antibiotic, Prodigiosin.** *Proc. Soc. Exper. Biol. & Med.* 1950, Nov., v. 75, No. 2, 374–8, 4 figs. [19 refs.]

According to these authors, no antibiotic has hitherto been shown to have any certain direct action on *Entamoeba histolytica in vitro ;* such effects as have been observed have been due to inhibition of growth of associated bacteria in the culture. They claim in these experiments to have proved a direct effect by prodigiosin, the antibiotic derived from *Serratia marcescens* [*Chromobacterium prodigiosum*], described here as a tripyrrole methane with the formula $C_{20}H_{25}ON_3$. This was added in different concentrations to a buffered egg yolk infusion rice starch medium also containing bacteria, which was then heavily inoculated with 2 strains of *E. histolytica*. A concentration of 1 in 2,000,000 prodigiosin caused degenerative changes, and 1 in 400,000 killed the amoebae in monobacterial culture (*Bact. aerogenes*) and 1 in 100,000 in mixed bacterial culture. The growth of the bacteria, the E_h and the *p*H of the cultures were unaffected by these concentrations. *L. P. Garrod*

CROPPER, C. F. J. **The Histopathology of Amoebic Pin-Point Craters.** *J. Trop. Med. & Hyg.* 1951, Apr., v. 54, No. 4, 71–2, 1 fig.

In 1945, the author [this *Bulletin*, 1946, v. 43, 38] as a result of extensive sigmoidoscopies in India expressed the view that the "pin-point crater" is the hallmark of chronic intestinal amoebiasis. This has since been accepted by other workers and the author now confirms his opinion, from the experience of some 2,500 sigmoidoscopies performed in four years on persons who had served in tropical or subtropical regions.

The work was done at the Ronkswood Hospital, Worcester, and is being supplemented by the histological examination of biopsy material. The lesions take the form of minute ulcers, not unlike the classical ulcers of the acute disease in miniature.

The persistence of these lesions over long periods and their appearance and disappearance with recurring bouts of bowel disturbance are illustrated by a case quoted by the author. It relates to a man who returned from internment in Japan with a history of undiagnosed dysentery and clinical features to support it. In 1947, small "acute" ulcers yielding *Entamoeba histolytica* were demonstrated on sigmoidoscopy and full specific treatment was given. Six months later, the patient was better, but not wholly restored to health. Sigmoidoscopy now revealed numerous pin-point craters and another course of treatment was given. These craters had disappeared after another six months and the patient felt well : but within nine months diarrhoea reappeared and scattered craters were again seen. These ultimately responded to treatment.

A photomicrograph illustrates the histopathological features of a biopsy taken from a patient who had contracted dysentery in Burma in 1944. Pin-point craters were found, but no *E. histolytica*. The craters were no longer visible after two full courses of anti-amoebic treatment had been given with an interval of 6 months between them.

In section, the crater is shown to extend down to the muscularis mucosae, burrowing on each side beneath the superficial intestinal glands. The cavity is

filled with débris and chronic inflammatory cells : on the floor of the ulcer, the cells infiltrate the muscle fibres. There is little inflammatory reaction and no apparent fibrosis.

The author discusses the significance of the pin-point lesion as a diagnostic criterion in relation to statistics of incidence and of cure : and he points to the need, as a result of the acceptance of this lesion being pathognomonic, for " a great deal of re-thinking among workers in this field ".

H. J. O'D. Burke-Gaffney

BONNIN, H. & MORETTI, G. F. L'hépatite habituelle de l'amibiase intestinale (étude par ponctions-biopsies). [**Study by Liver-Puncture Biopsy of the Hepatitis accompanying Intestinal Amoebiasis.**] *J. Méd. de Bordeaux.* 1951, Jan., v. 128, No. 1, 269–73.

Hepatic change, not necessarily due to the presence of parasites in the liver, is an invariable accompaniment of amoebic dysentery, both during the acute attack and during the stage of chronic amoebic colitis. There is a dull pain, with a feeling of heaviness during acute exacerbations, and slight liver swelling ; there is also a slight earthy tinge, and perhaps a little fever. These, and a variety of other minor and non-specific troubles, disappear with anti-amoebic treatment. Needle liver biopsy was done on four young persons with amoebiasis of tropical origin and suffering from these troubles, but with no other evidence of liver disease. In each case the MacLagan and the Hanger tests were positive, indicating liver dysfunction. Histological examination of the liver specimens indicated an increase of periportal connective tissue, sometimes pronounced, which may be the result of abortive amoebic colonization. *A. R. D. Adams*

STEMPIEN, S. J., MARCUS, D. M. & KELSO, R. W., Jr. **Amebiasis Masquerading as Appendicitis.** *California Med.* 1951, Jan., v. 74, 36. [Summary taken from *J. Amer. Med. Ass.* 1951, Apr. 7, v. 145, No. 14, 1093–4.]

At a Veterans Administration Hospital, Stempien and his associates were impressed with the frequency of amebiasis masquerading as appendicitis. The similarity was so striking in some cases that differentiation was frequently impossible on the basis of the clinical evidence alone but was dependent on past history, laboratory study, the course of illness and response to specific therapy. The authors present clinical observations on 15 patients in whom amebiasis closely simulated appendicitis. All the patients were referred by physicians with a diagnosis of acute appendicitis. Most cases had a history of previous similar episodes. The onset of illness was usually sudden, with nausea, occasional vomiting, frequently epigastric pain and, in all cases, right lower quadrant pain. In some cases loose stools were passed, and occasionally constipation was present. There was a history of previous diarrhoea or amebiasis in some cases. On examination, tenderness and rebound tenderness was often localized to the right lower quadrant, although in others it was more generalized. Muscle spasm was minimal or absent. The temperatute ranged from normal to 100°F. The leukocyte count ranged from normal in some cases to as high as 18,000 per cubic millimetre. Results of sigmoidoscopy and roentgen examination with barium enema were negative in all cases. Diagnosis was made in each case by the finding of Endamoeba histolytica in the stools and was corroborated by favorable response to specific antiamebic therapy. The authors feel that amebiasis should be considered in the differential diagnosis of appendicitis.

ROLLIER, R., MAURY, P. H. & MÉRET, I. Réactions cutanées chez des amibiens : " Para Amibiases ". [**Cutaneous Reactions in Persons suffering from Amoebiasis, " Para Amoebiasis ".**] *Maroc Méd.* 1950, Nov., v. 29, No. 306, 975–84, 3 figs. [64 refs.]

The authors describe and classify a wide range of incidental skin conditions encountered among persons shown to have intestinal amoebiais ; none of these was attributable to cutaneous amoebiasis. No true causal relationship between the protozoal infection and the skin condition was established, but emetine treatment of the former produced modification in the latter. *A. R. D. Adams*

BARGEN, J. A.. **Present Day Management of Amebiasis.** *J. Amer. Med. Ass.* 1951, Mar. 17, v. 145, No. 11, 785–9. [Refs. in footnotes.]

A review and discussion of present practice.

GUTCH, C. F. **The Treatment of Amebiasis, with a Preliminary Report on the Use of Aureomycin.** *Ann. Intern. Med.* 1950, Dec., v. 33, No. 6, 1407–12. [11 refs.]

Drugs employed in the treatment of amoebiasis can be divided into the following groups :—

(1) Emetine preparations.
(2) Oxyquinoline derivatives.
(3) Organic arsenicals, both pentavalent and trivalent.
(4) Others, which include the new antibiotics bacitracin and aureomycin.

Except for chloroquine, and some of its analogues, none of the oxyquinoline derivatives nor the arsenicals compare with emetine in efficacy against extra-intestinal amoebiasis. Emetine, carbarsone, and the iodo-oxyquinoline drugs are commonly employed in combination ; of 140 patients with intestinal amoebiasis treated in hospital 11·5 per cent. were not sterilized of their infections by this combination of drugs.

Emetine toxicity is often overlooked. Thirty-five patients were subjected to serial electrocardiographic studies during emetine treatment. Twenty-two of these had normal tracings after completion of the emetine course ; 13 (37 per cent.) had abnormal electrocardiograms, and 3 (8 per cent.) of these latter were abnormal for six weeks or more after completion of the emetine treatment.

Evidence of liver damage following emetine and carbarsone treatment was sought for in 8 patients by means of the cephalin flocculation test ; 7 of the 8 had raised tests, and one remained persistently raised for over 6 weeks.

Twenty patients with proven amoebiasis were treated with aureomycin ; the dosage was 0·75 to 1 gm. every 6 hours to a total of from 8 to 28 gm. Side-effects were minimal, but 2 patients complained of perianal itching lasting from 2 to 6 weeks. The stools of all these 20 patients were free from parasites on the completion of treatment. Two relapsed within 6 weeks, but on re-treatment with aureomycin were free of parasites up to 3 months after it ; the remaining 18 continued parasite-free over periods of observation from 3 to 5 months after treatment. Aureomycin compared favourably with other amoebicidal agents in affording prompt relief of symptoms and in eliminating parasites from the stools ; the relapse rate after it was no greater than that following other treatments, and the freedom from serious toxicity was a commendable feature. *A. R. D. Adams*

DE PAULA, A. Tratamento da amebíase pela aureomicina. [**Treatment of Amoebiasis with Aureomycin.**] *Rev. Brasileira Med.* Rio de Janeoir. 1951, Jan., v. 8, No. 1, 61–2.

The author, in Brazil, begins by referring to the cases of amoebiasis treated with aureomycin by McVay and his colleagues [see this *Bulletin*, 1949, v. 46, 1044] and later by Hughes [*ibid.*, 1950, v. 47, 748] and goes on to record six cases of his own. His patients ranged in age from 16 to 34 years, three were 28 and one 24 years. The dosage he used was 25 mgm. of aureomycin per kilo body-weight, *i.e.*, 1·5–2·0 gm. total daily dose divided into four or six doses. One patient received 500 mgm. every 6 hours for 8 days. The results have, so far, been excellent ; the stools became negative early and the clinical improvement was marked. The total amount given in the course was usually about 16 gm., but 20 gm. is recommended. Repeated examination has shown that the stools remained free of entamoebae or their cysts during varying periods of observation up to 11 months ; the drug was well tolerated.

H. Harold Scott

NOR EL-DIN, G. **Terramycin in Amoebic Dysentery.** *J. Roy. Egyptian Med. Ass.* 1951, v. 34, No. 2, 150–52.

Nine patients in Egypt with chronic amoebic dysentery in relapse were given terramycin. The usual total dose was 60 capsules or 15 gm. over 5 days [the author states that 2 capsules were given every six hours—this would only amount to 40 capsules in 5 days ; presumably they were given six times daily, that is every four hours].

The drug was well tolerated. Only one patient complained of side effects (nausea and epigastric pain).

Daily stool examinations were made, sigmoidoscopy was usually done before and after treatment and routine biochemical tests were made.

The parasitic amoebae disappeared in an average period of 2–4 days. Tenesmus improved on the third day, but diarrhoea persisted a little longer.

Three patients were given a combination of aureomycin and terramycin " in a dosage of 10 gm. for a period of five days ". The entamoebae disappeared in one day in two cases and in two days in the third. Improvement was more rapid than when terramycin was given alone.

Two other patients were given chloromycetin (10 gm. over a period of 5 days). In one, the symptoms improved, but the entamoebae persisted for 2 weeks : in the other the parasite disappeared in 2 days and clinical improvement occurred.

Most of the patients were observed for 1 to 3 months. Two of those given terramycin alone relapsed, one after 1 month, the other after 6 weeks. It is noted that, owing to a shortage of the antibiotic, these two patients had received only 19 and 13 gm. respectively : also one was a chronic relapsing case and the other had a concomitant malaria.

H. J. O'D. Burke-Gaffney

BUCCO, G. I possibili interventi chirurgici nell'amebiasi. [**Possible Surgical Intervention in Amoebiasis.**] *Acta Med. Italica.* 1950, Dec., v. 5, No. 12, 421–31. [47 refs.] English summary (7 lines).

In this article the author speaks not only of conditions and complications of amoebic infection in which operation may be called for, but also of cases in which operation is performed for conditions which have no connexion with a concomitant amoebic infection, and yet further, where conditions which would seem to call for surgical intervention are recognized as being due possibly to *E. histolytica* infection and clear up on medical treatment only.

The author divides his cases into two main groups, intestinal and extra-intestinal. In the former are included : massive haemorrhage, appendicitis, perforation and peritonitis, amoeboma, cicatricial stenosis and polyposis ; and in the latter group : abscess of liver, spleen and brain, cholecystitis, pleuro-pulmonary complications and cutaneous ulceration and abscess. He has a few words to say on each of these. Copious intestinal haemorrhage is a rare complication of amoebiasis, but its fatality is high. He quotes cases of appendicitis in which operation is carried out with apparent success, but the symptoms do not clear up entirely and faecal examination shows an amoebic infection and proper treatment is followed by cure. The diagnosis between amoebiasis and chronic appendicitis may not be possible and treatment of the former may get rid of the symptoms of the latter also.

The other conditions need not be mentioned singly, but, speaking generally, these patients usually present a condition of hypoproteinaemia and are not good subjects for operation. *H. Harold Scott*

MORETTI, G. F. & DESNUES, P. Remarques au sujet de l'hépatite amibienne expérimentale du chat. [**Experimental Amoebic Hepatitis in the Cat.**] *C. R. Soc. Biol.* 1950, Nov., v. 144, Nos. 21/22, 1504–5.

The discrepancy between the dependence of *Entamoeba histolytica* upon the accompanying bacterial flora when in culture and in the human intestine, on the one hand, and its existence under apparently aseptic conditions in the liver, on the other hand, has led some authors to suggest that the changes observed in the liver are initiated by bacteria, which are later eliminated. The authors undertook an investigation of this problem, by direct inoculation into the liver of kittens of the following material : old and recently isolated cultures of amoebae [presumably with mixed flora] ; culture of amoebae associated with *Clostridium sporogenes* ; culture of amoebae containing *Cl. welchii*, followed an hour and a half later by an injection of penicillin ; a mixture of a culture of amoebae with penicillin. The animals were killed between the 5th and 9th days, and their livers were examined macroscopically and microscopically.

In spite of the variation in the virulence of the different strains of amoebae used in the experiments, and of the diversity of the accompanying bacterial flora, the intrahepatic inoculation of cultures failed to produce typical amoebic lesions but gave rise only to bacterial abscesses. It is thought that these results might have been due to the fact that the mean oxidation-reduction potential in the kittens was +218 m.v. *C. A. Hoare*

MORETTI, G. F. Le potentiel d'oxydo-réduction dans l'amibiase intestinale expérimentale du chat. [**The Oxidation-Reduction Potential in Experimental Amoebiasis in Cats.**] *C. R. Soc. Biol.* 1950, Nov., v. 144, Nos. 21/22, 1499–500.

In order to study the *p*H and oxidation-reduction potential (Eh) of the caecum of kittens experimentally infected with *E. histolytica*, 16 animals aged 4 to 6 weeks were used. Laparotomy was performed on the anaesthetized animals and the caecum and terminal part of the ileum were exposed. A small incision was then made on the free avascular edge of the caecum and the very fine electrodes were inserted. Thereafter 1 ml. of culture material of *E. histolytica* from a strain which had been subcultured on 280 occasions, and similar material recently obtained from a patient with acute amoebiasis, were inoculated into the gut just above the ileo-caecal valve. Laparotomy was repeated on about the 9th and 15th days after inoculation and similar measurements

of *p*H and Eh were made, while at the same time the contents of the gut were examined for amoebae. After the second laparotomy the animals were sacrificed and examinations were made of the large intestine and liver. Ten of 16 kittens survived the complete experiment, while 8 animals failed to become infected. Details of the *p*H and Eh values obtained are given. The *p*H value increased by about one unit during the course of infection. The Eh value of the caecum was markedly reduced on average from a value of +35 m.v. to one of −175 m.v. between the day of inoculation and the 15th day in developed infections. On the other hand, in animals in which infection failed to develop, the Eh of the caecum was raised from +15 m.v. to +95 m.v. For the first time, the author claims, the importance of oxidation-reduction potential has been demonstrated during development of intestinal amoebiasis *in vivo*, and the rôle which bacteria play. *J. D. Fulton*

TAYLOR, D. Jane, GREENBERG, J., HIGHMAN, B. & COATNEY, G. R. **Experimental Infection of Guinea Pigs with** *Endamoeba histolytica*. *Amer. J. Trop. Med.* 1950, Nov., v. 30, No. 6, 817–28, 11 figs. [19 refs.]

An account is given of the course of experimental infection of guineapigs with *Entamoeba histolytica*. In this study 198 animals ranging in age from 10 days to 8 weeks were inoculated intracaecally after laparotomy with 24–48-hour cultures, with the use of a dose of 0·5 ml. containing from 50,000 to 250,000 amoebae. The guineapigs were kept on special diets, consisting of proprietary "rat pellets" or "rabbit pellets", to which fresh kale was added. The experimental animals were examined daily for clinical signs and were killed at different intervals (up to a maximum of 30 days), when detailed autopsy was carried out and the tissues were fixed for sections.

The mortality in the infected animals varied from 40 to 75 per cent., according to the diet, the death rate among those fed on rat pellets being almost twice as high as in those fed on rabbit pellets. The great majority of the animals that died had diarrhoea and were progressively losing weight. Post-mortem examination revealed amoebic lesions in the caecum and colon of all the 99 animals that died between 3 and 29 days after the inoculation, but only in 3 of 57 which survived and were killed on the 30th day. The histopathology of the infection, studied in 13 guineapigs, is described in detail: in six the ulcers were restricted to the mucosa, in three they extended into the submucosa, in three into the muscularis, and in one into the serosa, while one animal had a perforation. There were no lesions in the liver or other organs.

In view of the high rate of infection and the acute course of amoebic infection in the guineapig, this animal is regarded as more suitable for chemotherapeutic tests than the rat. For this purpose young guineapigs should be selected; they should be fed on a suitable diet, and infected with virulent strains of *E. histolytica*. *C. A. Hoare*

YANAI, T. **On the Influences of Seasonal Factors upon the Experimental Infection of** *Entamoeba histolytica* **in Rats.** *Kitasato Arch. Exper. Med.* 1950, Oct., v. 23, No. 2, 145–7.

The investigations reported in this paper were carried out with the view to determining whether the course of experimental infection of rats with *Entamoeba histolytica* varied according to the season. In the course of one year, rats were inoculated intracaecally with cultures of amoebae and killed a week later, when the caecum and its contents were examined for the presence of lesions and amoebae. It was found that the rates of infection were highest and lesions most frequent in summer, between July and September, when infection

was established in 19 (52·8 per cent.) and ulcers were formed in 14 (38·9 per cent.) out of a total of 36 rats ; during the two hottest months (July and August) the percentages were even higher, *viz.*, 61·3 and 45·2 respectively. However, in winter (January to March) infection was established in only 3 (13 per cent.) and lesions in 2 (8·7 per cent.) out of 23 rats.

The author could not detect any correlation between seasonal variations in the weight of the rats and their susceptibility to infection, but young animals proved to be more susceptible than old ones. *C. A. Hoare*

NEAL, R. A. **Some Observations on the Variation of Virulence and Response to Chemotherapy of Strains of *Entamoeba histolytica* in Rats.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Feb., v. 44, No. 4, 439–52, 1 fig. (26 refs.)

This investigation describes the experimental infection of rats 20 to 30 gm. in weight, apparently free from *Entamoeba muris*, with strains of the culture forms of *E. histolytica* obtained from human symptomless carriers and from others with acute relapsing amoebiasis. The method of infection was that described by JONES [this *Bulletin*, 1947, v. 44, 313] but mucin was not used to enhance virulence. Drug was administered orally once daily for 6 days and the animals were then sacrificed. Examination was made for the presence of amoebae directly or by subculture as well as for the presence of lesions in the gut wall. The latter were most common in the caecum but many occur in the colon. Strains from acute cases of amoebiasis were always virulent to rats and those from symptomless carriers were virulent or avirulent. The virulent type infected a slightly larger percentage of rats, and caused gross ulceration of the rat's intestine. They were observed to have engulfed bacteria, trichomonads, host tissue cells and red blood corpuscles. In general the avirulent amoebae caused no lesions or only those of minor severity. The character of the two types did not alter in culture and enhancement of virulence was not obtained after several encystment cycles of the avirulent type. Infection persisted for at least 9 weeks and in the case of rats infected by a virulent strain the animals still harboured amoebae 328 days after inoculation. Treatment with emetine, carbarsone, diodoquin and chiniofon showed that the virulent strains required more drug for cure. Specific resistance to emetine was not observed. Penicillin but not sulphonamides was able to cure a percentage of rats infected with a virulent strain. *J. D. Fulton*

MCCOWEN, M. C., CALLENDER, M. E. & LAWLIS, J. F., Jr. **Fumagillin (H-3), a New Antibiotic with Amebicidal Properties.** *Science.* 1951, Feb. 23, 202–3.

This article describes amoebicidal tests with a new crystalline antibiotic isolated from *Aspergillus* sp. The substance possesses only slight antibacterial or antifungal activity, and was inactive against MM virus (causing encephalitis in mice) and against that of influenza. It showed activity against *E. histolytica*, however, at extreme dilutions, in presence of a mixed bacterial flora. Tests carried out with the bacteria-free cultures described by SHAFFER *et al.* [this *Bulletin*, 1948, v. 45, 1001] indicated that the action of the antibiotic on the amoebae was direct. Experimental infections with *E. histolytica* in young rats and rabbits were cleared by oral administration of the antibiotic over a period of 2 days in total amounts of 36 and 100 mgm. per kilo, respectively. No activity was noted against certain trypanosomes and *Spirochaeta novyi* in mice. *J. D. Fulton*

COELHO, G. **Giardiasis in Children.** *Indian J. Med. Sci.* 1951, Feb., v. 5, No. 2, 40–47. [34 refs.]

A total of 1,478 stools and 1,271 rectal swabs of children in Bombay with acute or chronic diarrhoea were examined microscopically as follows :—

	Stools	Rectal Swab
Total	1,478	1,271
Positive for *Giardia*	154	43
Vegetative Forms	30	33
Cysts	105	10
Vegetative Forms and Cysts	19	0

In this series the youngest child infected was a month old.

Of 152 children, whose history was studied, and in whose stools and rectal swabs *Giardia* were found, symptoms were absent in 41.

Vegetative forms were found in 63 children, cysts in 115, and both in 19. Ten children, in addition, had infection with *E. histolytica.*

In the acute phase there is great urgency so that the clothes are often soiled. The stools are large, passed with force and flatulence. They are usually yellow in colour. Sometimes they may contain blood and mucus and the attack may simulate bacillary dysentery. The extreme acidity and the presence of excessive fat may be responsible for the diarrhoea. In the subacute and chronic stage the stools may be large and pale coloured resembling those in steatorrhoea. An important feature of this infection is its chronicity and tendency to recurrent attacks of acute diarrhoea. The treatment is simple and to be effective it must be persevered with for at least three months. The following routine is observed : mepacrine for seven days. The dose is ⅓ tablet thrice daily in children up to 2 years of age, ½ tablet thrice daily up to 5, ¾ tablet thrice daily up to 8 years and 1 tablet thrice daily above that age. (Each tablet contains 0·1 gm. of mepacrine.) Stovarsol (acetarsol) is given in dosage of ¼ grain once a day up to 2 years, twice daily up to 5, thrice daily up to 8, and four times daily after that, for three weeks.

In addition, dilute hydrochloric acid with glycerine pepsin before food, and iron, liver and vitamin B complex are prescribed after food, and during the acute phase a bismuth mixture is given to control the frequency. Response to mepacrine is very quick. In 24 hours the number of stools may be reduced from 30 to 5 per day. By the end of the course of treatment both cystic and vegetative forms disappear from the stools. Mepacrine and stovarsol are repeated in the same order for three months while the dilute hydrochloric acid, vitamin B complex and iron are continued for the duration of the course.

P. Manson-Bahr

RELAPSING FEVER AND OTHER SPIROCHAETOSES

BOURGAIN, M. Sur certains faits expérimentaux concernant l'épidémiologie de la fièvre récurrente à *Spirochaeta persica.* [**On certain Experimental Facts concerning the Epidemiology of Relapsing Fever due to** *Spirochaeta persica.*] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 689–91.

It is well known that strains of *Sp. persica* from different localities show considerable differences in their pathogenicity to laboratory animals. During

the past ten years the author has studied an Iranian strain, transmitted by *Ornithodorus tholozani*, and summarizes some of his results.

The hereditary transmission of the infection to the offspring of infected ticks is not constant. Adult ticks fed on the same infected animal do not all become infective. The tick may become infected at any stage in its development and in this case the infectivity is retained through subsequent stages. The emission of coxal fluid is not necessary to produce infection, as spirochaetes are present in the salivary secretion. Nymphs of *O. tholozani*, especially after the 2nd and 3rd moults, can live without food for some years, at least 50 per cent. surviving a fast of five years and remaining infective.

No evidence was found of the occurrence of transplacental transmission in experimental animals, but newly born young might become accidentally infected by being contaminated with blood of the mother containing spirochaetes. Residual cerebral infections were found in some of the animals, lasting up to 222 days in a guineapig, but its presence was inconstant. The spirochaete was found to survive at least 7 days in the putrified carcase of an infected guineapig kept at 4°C. A non-apparent infection with *Sp. persica* may occur in the guineapig. *E. Hindle*

DOLMAN, C. E., KERR, Donna E., CHANG, Helen & SHEARER, A. R. **Two Cases of Rat-Bite Fever due to** *Streptobacillus moniliformis*. [Abstract.] *Canadian J. Pub. Health.* 1951, Feb., v. 42, No. 2, 73.

" Two cases are described of febrile illness following rat bites on the fingers of female Indian children, aged 12 months and 3 years respectively. *Streptobacillus moniliformis* was isolated by blood culture from both patients on several occasions, while 10 weeks after they had been bitten, a pleuropnuemonia-like organism was obtained in place of the streptobacillus. Although clinically the cases were mild, their bacteraemic states persisted despite the successive administration of large doses of penicillin, aureomycin, and streptomycin. The *in vivo* resistance of this particular strain of streptobacillus to penicillin was confirmed by *in vitro* tests, and is at variance with the reports of other workers who have found *Streptobacillus moniliformis* to be quite susceptible to penicillin. These discrepant findings are probably due to the special liability of our strain of streptobacillus to undergo transformation to a penicillin-resistant pleuropneumonia-like variant.

" In the laboratory, considerable confusion arose from pseudo-spirochaetal artefacts of erythrocytic origin, which were mistaken for *Spirillum minus*. The thesis is submitted that the streptobacillus is the main, if not the exclusive cause of the rat-bite fever syndrome in man ; and that the role of the spirillum is subordinate, perhaps negligible, and at any rate unproven."

LEPROSY

TERNI, M. & SIGNORINI, F. L. **The Present Situation of Leprosy in Italy.** *Internat. J. Leprosy.* New Orleans. 1950, Oct.–Dec., v. 18, No. 4, Pt. 1, 519–23, 2 figs. [18 refs.]

Leprosy has been a notifiable disease in Italy since 1923. The census made in 1921 found 208 cases, but an accurate epidemiological investigation in 1947 showed 364. A map gives the distribution of cases, which is highest in south Sardinia. On the mainland there are two distinct zones, one in the north and one in the south where the most cases are round Cosenza. The central

part of the peninsula appears to be more or less exempt. Of the 364 cases 23 per cent. were of foreign origin. The largest group of 175 were autochthonous, generally occurring in small groups often around imported cases, while the next largest group are classified as of unknown origin.

At the end is given a list of recent therapeutic and other studies made in Italy.

Ernest Muir

INNES, J. R. **Leprosy in Uganda. A Survey in the Busoga District of the Eastern Province.** *Internat. J. Leprosy.* New Orleans. 1950, Oct.–Dec., v. 18, No. 4, Pt. 1, 507–17, 1 fig.

This survey is one of a series that has been made by the author in E. Africa [see this *Bulletin*, 1949, v. 46, 283, 638 ; 1950, v. 47, 365, 366, *bis* ; 1951, v. 48, 160, 161]. The district surveyed lies to the east of the first part of the River Nile where it joins the great lakes of Victoria and Kyoga. Out of the total population of 208,583 there were examined 35,118 persons and 1,177 of them were found to be suffering from leprosy, making 33·5 per mille. Of these 740 were males ; 19 per cent. were children under 14 years of age ; tuberculoid cases with raised lesions formed 52 per cent. of the whole, and 22·3 per cent. were lepromatous cases, rather a higher number than in other parts of E. Africa. A particular feature is the frequency of " Old Folks' Leprosy ". This is found in apparently otherwise healthy old people who did not have the disease in earlier life but developed it in advancing years. There were 16 of these cases (1·3 per cent.) in patients of 50 and upwards. It is suggested that this may be due to the breaking down of resistance in old age, and their existence is taken as an indication that there is a fairly high prevalence of infection in the community. Possible reasons, among others, for the high prevalence of leprosy here and throughout the region round Lake Victoria may be dietary deficiency, high humidity, and the commonness of scabies. There is only one institution serving this district, with a present capacity of 300. What makes antileprosy action more urgent is the development of a great hydro-electric scheme intended to harness the output of Lake Victoria, which by disturbing the life of the district may spread leprosy still more.

Ernest Muir

INNES, J. R. **Leprosy in Northern Rhodesia.** *East African Med. J.* 1951, Jan., v. 28, No. 1, 21–8.

The services of the author could only be spared for a period of one month, so that important parts of N. Rhodesia had to be left out, including Barotseland [which previous investigations have indicated is the most highly endemic part of the country]. The density of the population (1,600,000) is very low, only 5·5 per square mile, which makes an accurate survey all the more difficult. Twenty-three samples of population were examined including 27,915 persons among whom a total of 352 cases of leprosy were found ; which indicates an average incidence per thousand of 12·6 and the probable existence in the country of 20,000 cases. The proportion of males to females was 219 to 133 ; and there were 18·4 per cent. of children, indicating that leprosy is alive and growing in the community. The percentage of lepromatous cases was 20·4. Although the population of the country as a whole is widely scattered the people crowd together in their houses and villages, which helps the spread of the disease. " Some degree of segregation of known cases exists, as seventy-eight cases or twenty-two per cent. lived alone. This was spoiled by the fact that 214 cases, or 60·7 per cent. of the whole, lived in home contact with a total of 896 children between them. This living with children by leprosy cases is at the very root of the reason for the persistence of leprosy amongst African tribes."

Eight suggestions are made for dealing with the problem : free issue of sulphone drugs ; appointment of a territorial leprologist ; strengthening, encouraging and enlarging of the regional leprosaria ; establishment of a new central leprosarium of 1,000-patient size ; the avoidance of compulsion and rigid repressive legislation ; the development of the outward look (taking an interest in the people of its region) in all leprosaria ; not siting leprosaria in humid areas ; supplementary propaganda so as to prevent contact of patients with children and to encourage village segregation of open cases.

Ernest Muir

See also p. 607, DE MELO, I. F. **A malária, a tuberculose e a lepra em Goa.**

RODRIGUEZ, J. N. **Epidemiological Studies on Leprosy in Cebu Province.** *J. Philippine Med. Ass.* 1950, Jan., v. 26, No. 1, 37–44. [12 refs.]

The epidemiological surveys of Dr. Rodriguez and others, with the expert advice of Dr. Doull, in the Cebu Province of the Philippines for the last 20 years are the most prolonged and thorough field studies of leprosy that have ever been successfully attempted. Among the findings are the following : Positive contact with a previous case was proved in 80 per cent. of the leprosy cases ; the incidence among children of 10 to 14 years was double that of the community as a whole ; for persons exposed to cases of leprosy in the household the average incidence was 4 times the rate in the whole community ; when the primary case was lepromatous the risk of developing leprosy for persons exposed in the households was 8 times the community rate, but if the case was bacteriologically negative " neutral " or tuberculoid type, the prevalence rate was not significantly higher than in the general population ; the average duration of lepromatous cases before presenting themselves voluntarily for admission was 3 years. The survey has however so far failed to explain why leprosy spread in Talisy and Cordova but hardly maintains a foothold in Santander. Against the theory that heavy rainfall is the cause, the most affected province of Cebu is one of the driest in the country.

The conclusion arrived at is " What is needed to supplement the segregation policy is obviously an educational campaign with the purpose of encouraging presentation of cases for segregation as soon as possible after detection."

Ernest Muir

MALARET, P. S. **Leprosy in Puerto Rico.** *Bol. Asoc. Méd. de Puerto Rico.* 1951, Jan., v. 43, No. 1, 15–64. [27 refs.]

Leprosy is supposed to have reached this island either with the original immigrants from Europe or with the slaves from Africa. No thorough survey of leprosy has ever been made, but 154 cases were admitted to the leprosarium between 1926 and 1950. An account is given of these patients, their types, age of onset of the disease, treatment and other particulars which are chiefly of local interest.

Ernest Muir

SANTOS ZETINA, F. El problema de la lepra en Yucatán, segun observaciones del dispensario antileproso de Merida. [**The Problem of Leprosy in Yucatán according to the Observations in the Antileprosy Dispensary at Mérido.**] *Rev. Méd. Yucatan.* 1951, Feb. 28, v. 26, No. 3, 254–7.

No regular survey was done, but most of the patients in Yucatán attend the Merida clinic, and the observations are based on those who have attended the clinic since its inception 2 years ago. There were 95 ambulatory cases and 12 in hospital. Only 6 cases were found among 380 contacts examined, but

this small number was due to patients hiding themselves and giving wrong addresses. Fifty-two cases (almost half) were of the lepromatous type. [This may mean that the leprosy in Yucatán is of a bad type, or it may simply mean that a very large proportion of the milder cases was not seen. As total population and percentages are not available it is difficult to form an estimate of the gravity of leprosy in the country.] Among whites and mixed races there were 58 and 44 respectively, and only 4 among Indians, the reason for the fewness of the latter being that they live far away and do not mix with others.

Ernest Muir

FLOCH, H. & DESTOMBES, P. Réaction léprotique et réaction tuberculoide ulcéreuses. Discussion des termes "lèpre lazarine" et "lèpre de Lucio". [**Leprosy Reaction and Reacting Tuberculoid Ulceration. Use of the Terms "Lazarine Leprosy" and "Lucio's Leprosy".**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 653–7. [11 refs.]

The authors refer to a form of leprosy described by LUCIO and ALVARADO in 1852 as "lazarine leprosy" in Mexico, and later by many others in other countries. The case they describe in French Guiana is considered to belong to this form of the disease. The patient had several patches which were entirely anaesthetic and bacteriologically negative, while large parts in the centres of these patches had ulcerated and later healed up, leaving scars. The authors did not do the lepromin test, but considered that though their case might correspond with what had been called "lazarine leprosy" it was in reality a reacting tuberculoid.

Ernest Muir

ALANDAROV, I. N. [**Histopathology of Apparently Intact Skin in Leprosy.**] *Vestnik Venerologii i Dermatologii.* Moscow. 1950, Sept.–Oct., No. 5, 37–40, 4 figs. [In Russian.]

The author reports the results of a histopathological study of the early changes in the apparently intact skin of leprosy patients, with special reference to the nervous apparatus. For this purpose portions of the skin were excised in 12 patients, of whom six were suffering from the nodular form and six from the tubercular form of leprosy. Pathological changes were found in the skin of all these cases, the type of the cellular infiltration differing according to the form of the disease. In the case of the nodular form, there was proliferation of the endothelium of the blood vessels and narrowing of their lumen, with Hansen's bacilli present in the endothelial cells. In both forms of leprosy, degenerative changes affected mainly the thick myelinated nerve fibres of the skin, while in the thin non-myelinated fibres the changes were not so pronounced. Both quantitatively and qualitatively, the changes in the nerves of the intact skin were more marked in cases of nodular leprosy than in those of the tubercular form.

C. A. Hoare

PARAS, E. M. **An Interpretation of Calcium Protein Findings in Sera of Lepra Reaction Cases by means of the McLean-Hastings Equation.** *Internat. J. Leprosy.* New Orleans. 1950, Oct.–Dec., v. 18, No. 4, Pt. 1, 473–80, 1 fig. [12 refs.]

The author has made a study of the deficiency of calcium in leprosy, especially during lepra reaction. The deficiency is not in diffusible calcium but in the protein-bound non-diffusible calcium. This, he suggests, is due to the diminution of albumin in the serum relative to globulin, which occurs in lepra reaction, calcium being combined with albumin and not globulin. The diminution of

albumin leads to dissociation, and hence the low combined, and high dissociated, calcium. Had the calcium deficiency been due to changes in calcium metabolism both the combined and the diffusible calcium would have been diminished. The author suggests that by increasing the albumin there would be more association of albumin and calcium ions to form calcium albuminate, and that therefore parenteral protein therapy may be of value. This may be supplemented with calcium administration so as to furnish ready material to facilitate the process. *Ernest Muir*

LEVINE, M. **Hemagglutination of Tuberculin Sensitized Sheep Cells in Hansen's Disease (Leprosy).** *Proc. Soc. Exper. Biol. & Med.* 1951, Jan., v. 76, No. 1, 171–3, 1 fig.

By a modification of Middlebrook and Dubos' technique [*Bulletin of Hygiene*, 1949, v. 24, 278] the agglutination of sensitized sheep red cells by the serum (*a*) of 80 active cases of leprosy is compared with agglutination of serum from (*b*) 96 tuberculosis patients, (*c*) 25 released bacteriologically-negative leprosy cases, and (*d*) 40 cases taken from a blood bank. In (*a*) the 1 : 4 or lower titre was found only in 10 per cent. ; while in (*b*) there were 23 per cent. ; in (*c*) 56 per cent. ; and in (*d*) 90 per cent. with a 1 : 4 or lower titre. The author concludes that *Myco. tuberculosis* and *Myco. leprae* " possess common antigens which stimulate common agglutinins in human sera. This does not necessarily indicate a corresponding immunological response." The question of the efficacy of BCG vaccination of children of leprous parents as a protective measure against leprosy is raised. As inability to grow *Myco. leprae* has hampered serological study of leprosy, this haemagglutination test may be useful in future investigation of this subject. [For a trial of BCG vaccination in prophylaxis of leprosy, see MONTESTRUC and BLACHÉ, this *Bulletin*, 1951, v. 48, 270.] *Ernest Muir*

WADE, H. W. **The Reactions to Lepromin in Man. I. A Suggestion of possible Desensitization of the Early Reaction.** *Internat. J. Leprosy.* New Orleans. 1950, Oct.–Dec., v. 18, No. 4, Pt. 1, 487–92. [10 refs.]

This is the first of a series of articles on reactions to lepromin. There is no general agreement as to the nature of the " early " and " late " reactions to lepromin and their relationship to each other. LOWE and DHARMENDRA [this *Bulletin*, 1942, v. 39, 227] hold that both reactions are of the same nature and are due to previous sensitization, while FERNANDEZ [*ibid.*, 1943, v. 40, 245 ; 1945, v. 42, 297] concludes that the " early " is due to this but (following WADE [*ibid.*, 1941, v. 38, 703]) that the " late " results from an allergic condition induced by the injection of antigen.

The present report is on the results of injecting a single individual with 4 different lots of lepromin diluted 1 in 5. Injections of 0·1 cc. of these antigens were made at one time and repeated twice over at intervals of 48 hours. The readings of only the first and second occasions are recorded, as those of the third occasion were held to have been affected by the onset of the " late " reaction of the first. The 48-hour readings of the injections on the second occasion were less strong than those of the first injections, and the suggestion is made that the first injections had resulted in a certain amount of desensitization, in the same way that tuberculous animals can be desensitized with respect to tuberculin without losing the immunity induced by the desensitizing infection. Directions are offered for further experimentation in order that these suggestions may be further investigated. *Ernest Muir*

DE SOUZA-ARAUJO, H. C. Caso de lepra aguda malígna, com infecção do cônjuge em três meses de vida matrimonial. Isolamento de um bacilo ácido-álcool resistente (cultura cromogênica), de lesão cutânea desse doente, parogênico para murídeos, " Macacus rhesus " e para o homem. [**Case of Acute Malignant Leprosy, with Infection of the Consort within Three Months of Matrimonial Life. Isolation from a Cutaneous Lesion of the same Patient of an Acid-Alcohol Fast Bacillus (Chromogenic Culture) Pathogenic for Rats, Mice,** *Macacus rhesus* **and Man.**] *Mem. Inst. Oswaldo Cruz.* 1950, v. 48, 51–75, 2 text figs. & 36 figs. on 7 pls. (13 coloured). English version 76–99.

A case of leprosy with three months' history and with certain peculiar features is described. Two pathologists to whom biopsy material was sent on several occasions disagreed as to whether the case was one of a reacting tuberculoid or lepromatous leprosy. Apparently features of both types were present. The many nodules present and the massive infection with acid-fast bacilli found in the nodules and in smears from the nose were characteristic of the lepromatous type as was also the fact that the patient's wife acquired leprosy within three months after their marriage ; while patches with a depressed centre, the absence of symmetry, and the fact that the lesions healed up rapidly and became bacteriologically negative in a short time are evidence of the reacting tuberculoid. [The case was probably one of those familiar to most leprologists and which have been described as " Intermediate " ; although showing massive infection like a lepromatous case, they are asymmetrical, heal up surprisingly quickly under sulphones, and in a few cases the lepromin test becomes slightly to moderately positive.]

Material taken from this case was planted on Loewenstein's medium, and a golden-yellow colony was obtained, smears from which stained by the Ziehl-Neelsen method showed blue-coloured bacilli mixed with " roundish groups of acid-alcohol-fast bacilli looking like globias ". The author was uncertain whether this was Hansen's bacillus or not. A suspension of this injected intradermally into the patient himself and his wife produced very strong reactions locally. [This in itself is evidence that the culture was not one of Hansen's bacillus, as the injection of Hansen's bacilli of which there were already large numbers in the body, should not have caused such a violent reaction locally.]

Ernest Muir

DE SOUZA-ARAUJO, H. C. Caso de lepra malígna (L2-N1) que regrediu ràpidamente sob a acção duma terapêutica mista (sulfona-fisioterapia). Isolamento de um bacilo ácido-álcool resistente (cultura não cromogênica) de lesão cutânea desse doente, patogênica para murídeos, " Macacus rhesus " e para o homem. [**Case of Malignant Leprosy rapidly regressing after Treatment by a Sulphone associated with Physiotherapy. Isolation from a Cutaneous Lesion of the Patient of an Acid-Alcohol Fast Bacillus (Non-Chromogenic Culture) Pathogenic to Man and to Laboratory Animals.**] *Mem. Inst. Oswaldo Cruz.* 1950, v. 48, 101–6, 11 figs. on 2 pls. English version 107–12.

The same author obtained another culture from a lepromatous case of leprosy, which he suspected to be *Myco. tuberculosis*, but inoculation in guinea-pigs disproved this, sections from the animals showing an acute purulent inflammatory process but no tuberculous follicles. Inoculation in *Macacus rhesus* monkeys produced local nodules in the forehead, the histopathology of which was similar to that of human leproma. The culture has been sent for study to various institutions.

The patient recovered rapidly under treatment with Diasone supplemented with galvano-cauterization of the lesions. *Ernest Muir*

RYRIE, G. A. **The Psychology of Leprosy.** *Leprosy Review.* 1951, Jan.–Apr., v. 22, Nos. 1/2, 13–24.

This study of the psychology of leprosy is divided into 3 aspects : that of the administrator who has to do with leprosy, that of the doctor, and that of the patient himself. The author bases the attitude of unreasonable fear of leprosy on the Freudian doctrine of inherent sense of guilt. There are thousands of cases of leprosy in the United States, and with the resources available the disease could easily be stamped out within a generation, but " the instinctive yielding to the guidance of the guilt complex, however, prevents any rational approach. It is probable that in spite of modern knowledge there are as many cases in the U.S.A. as there were 50 years ago." Regarding doctors the author says : " It is much more genteel and far more interesting to hold learned discussions on the various points . . . than to examine patients." The patient's reactions to leprosy, to settlement life, to crippling, and to the sympathetic or unsympathetic doctor are all graphically described, and, lastly, the remarkable alteration in the psychology of the patient as the result of modern treatment. *Ernest Muir*

COCHRANE, R. G. **Chemotherapy in Leprosy.** *Practitioner.* 1951, Apr., v. 166, No. 994, 373–81. [18 refs.]

LAVIRON, P. & LAURET, L. Chaulmoogriques et sulfones dans la thérapeutique de la lèpre. [**Chaulmoogra Preparations and Sulphones in the Treatment of Leprosy.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 739–47, 4 figs. on 4 pls. [11 refs.]

The authors give a short history of their own experience of treatment of leprosy, first with hydnocarpus oil and later with sulphones. In their opinion the ethyl-esters of Gorli oil produced quicker results than those with the esters of hydnocarpus oil. They discuss the relative values of DDS and Cimédone (a French preparation with the same formula as Sulphetrone). Lastly endorsement is given to Rogers's suggestion that a combination of sulphones and hydnocarpus oil should be used. *Ernest Muir*

FLOCH, H. & DESTOMBES, P. Réactions léprotiques et traitements sulfonés. [**Leprosy Reactions and Sulphone Treatment.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 726–32. [11 refs.]

Sulphone therapy has fixed attention on lepra reaction, which is most common in the first months of treatment. In some there are reactions before treatment begins, and in others reactions are induced by the treatment. In some there is a threshold of concentration of the drug above which reaction takes place. The authors have used the " parent-sulphone " (DDS) both orally and by intramuscular injection, and find that it produces more reactions by the former route (47 per cent.) than by the latter (8 per cent.). [It is not mentioned that oral administration produces a much higher temporary concentration than intramuscular injection of an oily suspension of DDS, a fact which may account for the larger number of reactions. Nor is it apparently realized that sulphone-induced reactions are not an unmixed evil as they may speed up the elimination of bacilli.] The authors consider that with DDS, by whatever route it is given, activity and " tolerance " [in relation to " eventual signs of toxicity,

notably anaemia "] are more constant than with Promin, Diasone and Sulphetrone. In cases prone to reaction, especially if the eyes are involved, they advise the use of the intramuscular route, at least for a time.

While the authors are not inclined to favour "*sulfone disubstituées*" (Promin, Diasone, Sulphetrone), they use a "*sulfone monosubstituée*", 1·500F (succinyl-diamino-diphenyl-sulphone). This can be given intramuscularly or intravenously in a watery solution. They do not believe in the use of antimony or antihistamines in the control of sulphone-induced reaction, but find that vitamin D_2 is beneficial in reacting tuberculoid cases. In such tuberculoid cases they also find that the course of the disease is shortened by the use of sulphones. *Ernest Muir*

RODRIGUEZ, J. N. **Latest Results with Sulphone Drugs at the Central Luzon Leprosarium, Novaliches, Rizal.** *J. Philippine Med. Ass.* 1949, Sept., v. 25, No. 9, 435–40. [10 refs.]

After a short review of the literature the author reports his experience with 92 patients in the Luzon Central Leprosarium who were treated over periods of 6 months to 3 years with Promin. There was improvement in 81 per cent. of whom 7·5 were markedly improved. The best results were among those getting 2 to 3 gm. per day. Two reasons why patients could not tolerate larger doses were anaemia and frequent lepra reactions. The bacteriological improvement did not correspond with the clinical, and none became bacteriologically negative.

Diasone was also used in 149 patients. Of the 72 who had treatment for a year, 5·6 per cent. became bacteriologically negative and 13·9 per cent. markedly improved. Fifty per cent. had lepra reaction, and the dosage had to be increased very gradually. In the author's opinion failure with this drug is due to increasing the dose too rapidly. The results were very similar to those with Promin. Mixed sulphone treatment with a view to synergistic effect was not successful. The cost per patient per year was estimated at 60 pesetas.

Ernest Muir

FERON, J. Sur le Cimédone dans le traitement de la lèpre. [**Cimédone in the Treatment of Leprosy.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 658–62, 9 figs. on 6 pls.

Twenty patients, 3 of the neural type, 1 mixed, and 16 lepromatous were treated with Cimédone combined with Vitamin B preparations. Cimédone has the same formula as the English product Sulphetrone. In the neural cases there was no improvement. In the others Cimédone accelerated improvement clinically. Some photographs of patients before and after treatment are given, showing clinical improvement, but 6 months is too short a period to give bacteriological improvement. *Ernest Muir*

LOWE, J. **The Sulfone Treatment of Tuberculoid Leprosy.** *Internat. J. Leprosy.* New Orleans. 1950, Oct.–Dec., v. 18, No. 4, Pt. 1, 457–68. [20 refs.]

Early reports of sulphone treatment indicated that though sulphones were useful in lepromatous cases, they had little beneficial effect on trophic lesions caused by the destruction of nerves. This was taken by some workers to mean that sulphones were of no value in the treatment of non-lepromatous forms of leprosy. COCHRANE stated categorically the opinion that "no case showing neural macules, tuberculoid or neural anaesthetic lesions should be given

sulphone therapy" [this *Bulletin*, 1949, v. 46, 943]. This meant that in the great majority of leprosy cases in India and Africa this form of treatment was useless.

The author in Nigeria has made a study of more than 50 tuberculoid cases for periods up to 24 months, using Sulphetrone and DDS, and obtaining excellent results especially with the latter drug. He found that there were 3 phases in the course of healing: (*a*) Increased reaction especially in major tuberculoids in which the lesions showed inflammatory swelling, (*b*) subsidence with desquamation, (*c*) the later phases lasting from 6 to 12 months in which there is a gradual restoration of pigment and sensation.

So uniform are these results that the author suggests the use of this effect on tuberculoid cases to determine the effectiveness of any drug to be tested for its employment in leprosy. Thus sulphones in normal doses produced a definite response within a month; Sulphetrone in very small doses (0·25 gm. a day) produced no response in 6 weeks; para-aminosalicylic acid, 15 gm. a day, produced no response in 6 months in lepromatous cases; hydnocarpus oil injections produced no definite response in 2 months; streptomycin, 1 gm. a day, produced a very definite result within a week, but no trials have been made of it in lepromatous cases. The author's conclusion is "that these results give a clear indication that the two most active agents in leprosy are sulphones and streptomycin, and that the most effective treatment of leprosy is probably the use of these two drugs in combination". This matter is now being studied further.

In the discussion the author suggests that it may be objected that these tuberculoid cases would have healed up spontaneously if treatment had not been given, as such cases very frequently do. Against this there is the fact that in the part of Nigeria where the trials were made tuberculoid activity, generally, shows no tendency to change with the season; also many of the cases had been observed for some time before sulphone treatment began without showing any improvement, but whenever treatment was begun immediate improvement occurred whatever the season of the year; finally, there is "the finding that in fifty consecutive cases, unselected except for their activity, the institution of sulphone treatment was followed in every case by a response which within one year led to the disappearance of all signs of activity in skin and nerve, although nerves frequently remained hard and fibrous. These results are far too constant, too rapid and too striking to be attributed to spontaneous subsidence." The final conclusion is that "the sulphone drugs constitute the therapy of choice in tuberculoid as well as lepromatous cases." [For earlier reports by the author, see this *Bulletin*, 1950, v. 47, 474, 475.]

Ernest Muir

SCHNEIDER, J. État actuel de l'expérimentation de nouvelles thérapeutiques de la lèpre. (Thiosémicarbazone—Suspensions huileuses de D.D.S.). [**Current Studies of the Use of New Therapeutic Measures in Leprosy (Thiosemicarbazone: Oily Suspensions of DDS).**] *Rev. Brasileira Leprologia.* S. Paulo. 1950, Dec., v. 18, No. 4, 186–205, 12 figs.

An account is given of the treatment of 14 cases of leprosy with thiosemicarbazone (TB1), 1 for 11 months, 8 for 9 months, and 5 for 3 months. Considerable clinical but no bacteriological results were noticed in these short periods. Signs of intolerance were only slight and did not seriously interfere with the treatment. Daily doses up to 200 mgm. were given. It is considered that this drug is decidedly effective in leprosy and that it is likely to be particularly useful in cases which do not yield to other drugs.

DDS also was tried out in some 35 cases for 3 to 6 months, by injections of 1·25 gm. of DDS suspended in 5 cc. of ethyl esters of chaulmoogra oil, twice a month. The clinical results even in that time have been marked and in 9 or 10 cases there has been a diminution of bacilli in smears from the nose.

Ernest Muir

SCHNEIDER, J., LAVIRON, P., LAURET, L. & BASSET, A. Traitement de la lèpre par le thiosémicarbazone (T.B.1). Résultats d'une première expérimentation de 11 mois. [**Treatment of Leprosy with Thiosemicarbazone, TB1. Results after 11 Months.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 733–9, 2 figs. on 2 pls.

An account is given of the treatment of 14 cases of lepromatous leprosy with TB1 (thiosemicarbazone) the best tolerated of this group of drugs. Reference is made to the results that have been obtained in Germany both in laboratory animals infected with *Myco. tuberculosis* and in various clinical forms of tuberculosis. The authors began to use it in leprosy on 15th September 1949 on a patient who had had the disease since 1927 and whose condition had not yielded to various treatments including Diasone, Cimédone, and even streptomycin. After a month's treatment with TB1 the patient felt considerably better. The patient continued the treatment up to date. This one patient had been treated for 11 months, 8 patients for 9 months, 5 for 3 months. In all there was tolerance of the drug, and though reactions were produced these were not severe enough to require suspension of treatment. Except in the first case no anaemia was caused. The dose was 100 mgm. a day to begin with, raised after a short time to 150 mgm. and later to 200 mgm. In all cases there was clinical improvement, but in none were the authors able to detect diminution of bacilli in the short time under review. The results appeared to the authors similar to those with sulphones as far as clinical improvement was concerned, and it is suggested that TB1 may be useful in cases which do not yield to sulphones or other drugs.

Ernest Muir

VEGAS, M., CONVIT, J., ANTONIO MEDINA, J. & DE BLOMENFIELD, Elena. **Thiosemicarbazone (TB-1) in the Treatment of Leprosy. Preliminary Communication.** *Internat. J. Leprosy.* New Orleans. 1950, Oct.–Dec., v. 18, No. 4, Pt. 1, 451–5.

The authors, learning of the favourable results with thiosemicarbazone "TB-1" obtained in the treatment of tuberculosis in Germany, tried it out in 43 patients with leprosy of the lepromatous type. As no manifestations of intolerance were caused by smaller doses they increased the daily oral dose by 25 or 50 mgm. per week up to 650 or even 900 mgm. (18 tablets). The results found were as follows :—

In 5 and 6 months—	
Very important regression of lesions ...	21 patients
Important regression of lesions	7 patients
Partial regression	6 patients
In 3 and 4 months—	
Very important regression of lesions ...	1 patient
Important regression of lesions	2 patients
Partial regression	5 patients
In 2 months—	
Partial regression of lesions	1 patient

Twenty-seven of the patients had reaction during the course of treatment, but in only 2 of these did the reaction necessitate suspension of the drug. In only 4 cases was there appreciable decrease in the number of bacilli.

Ernest Muir

PARDO-CASTELLO, V., TRESPALACIOS, F., TIANT, F. R., IBARRA, R., JOSE MESTRE, J. & BEADE, P. **The Treatment of Leprosy with Chloramphenicol. An Experimental Trial with Negative Results.** *Internat. J. Leprosy.* New Orleans. 1950, Oct.–Dec., v. 18, No. 4, Pt. 1, 469–72.

A trial was made of chloramphenicol [chloromycetin] in 6 cases of lepromatous leprosy. Doses of 50 mgm./kgm. of body weight per day, were administered at intervals of 4, 6 or 8 hours for 6 consecutive days. After a rest of 6 or 7 days a second course was given, also lasting 6 days. In 2 of the cases a third course was given. Tolerance was good except for a little initial vomiting and diarrhoea. No improvement was noticed either clinically or bacteriologically.

Ernest Muir

NOËL, R. & MARIE-SUZANNE. Étude histologique des lésions provoquées chez le rat sauvage par l'inoculation de bacilles de Hansen. [**Histological Study of the Lesions produced in Wild Rats after Inoculation of** *Mycobacterium leprae.*] *Internat. J. Leprosy.* New Orleans. 1950, Oct.–Dec., v. 18, No. 4, Pt. 1, 493–506, 19 figs. on 3 pls.

Many attempts have been made to inoculate *Myco. leprae* in experimental animals, and since 1912 rats have been chiefly used, with two objects in view : if possible to reproduce human leprosy, and to study the pathological changes brought about by the presence of the bacilli. Marchoux found that Hansen's bacilli persisted in the tissues of rats up to two years, but neither he nor other workers have been able to confirm multiplication of these bacilli. In this study, the effects are described of inoculation in the testes of 7 male rats and in the skin of 4 female rats. These were killed and examined at periods after inoculation varying up to 20 months. Within 10 days of inoculation of the testes bacilli were found in the cytoplasm of histiocytes, often at a considerable distance from the point of inoculation, although there were few lymphocytes present or other signs of reaction to the bacilli. These signs occurred at a later stage when tuberculoid follicles were formed in the intertubular spaces, with epithelioid cells in the centre surrounded by lymphocytes, but with no trace of bacilli except for granular, slightly acid-fast, débris. The bacilli seem to disappear as soon as the epithelioid follicle is completely surrounded with lymphocytes. In one rat killed after 10 months both tuberculoid and lepromatous forms of histology were seen. Tuberculoid lesions similar to those of the testes were found in the skin of the female rats. Attention is drawn to the vast differences between this picture and that which is seen when rat leprosy bacilli are inoculated in rats. The article is well illustrated with 19 photomicrographs.

Ernest Muir

HELMINTHIASIS

VARTIAINEN, O. Maskproblemet i Finland. [**The Problem of Intestinal Worms in Finland.**] *Nordisk Med.* 1951, Mar. 7, v. 45, No. 10, 343–4. English summary (3 lines).

BEAVER, P. C. **The Standardization of Fecal Smears for estimating Egg Production and Worm Burden.** *J. Parasitology.* 1950, Oct., v. 36, No. 5, 451–6, 1 fig.

" Egg counts on either *Ascaris lumbricoides* or *Trichuris trichiura* are about equally variable, and presumably equally reliable, by the standard direct smear (Beaver, 1949) and dilution methods (Stoll, 1923).

"By comparison with the original standard smear the quantities of feces in smears of various densities ranging from very heavy to very light were found, and from these data the densities of smears containing 1/200, 1/300, 1/400, 1/500, and 1/1,000 cc. of feces were determined.

"A barium sulfate suspension, one drop (0·05 cc.) of which has the same density (turbidity) as the fecal smear, was described for each of the standard smears."

WATSON, J. M. **Studies on Bilharziasis in Iraq. Part V. Habitat of the Vector Snail, *Bulinus truncatus*, and its Distribution in relation to the Irrigation System.** *J. Faculty of Med., Baghdad, Iraq.* 1950, Sept.–Nov., v. 14, Nos. 5/6, 148-182b, 1 map. [41 refs.]

This account of the distribution and biology of *Bulinus truncatus* in the irrigation system of Iraq is a valuable contribution to the study of schistosomiasis, particularly in view of the paucity of published work on the biology of the molluscan vector of *S. haematobium* as compared with the extensive literature concerning the adult worm and its development and control while in the human host. The following are some of the points discussed in the paper. (1) General nature of the habitat with reference to (a) permanence, (b) water stagnation, (c) water pollution, (d) substratum and (e) vegetation. (2) Special types of habitat with reference to the occurrence of *B. truncatus* in (a) perennial streams, (b) lakes, (c) swamps, (d) isolated pools, (e) irrigated channels, (f) wells, (g) rice fields, (h) borrow pits. (3) Limiting factors which may render the habitat unsuitable for *B. truncatus* such as (a) temperature, (b) desiccation, (c) water movement, (d) change of water level, (e) lining of the channel, (f) salinity, (g) acidity, (h) anti-malaria measures, (i) length of season and (j) extreme pollution. (4) The distribution of *B. truncatus* in relation to the irrigation system. Broadly speaking *B. truncatus* is confined to the perennially irrigated area, but its distribution in the canal system is influenced by various local factors which are discussed in some detail by the author. *R. M. Gordon*

MAINZER, F. Viscerale Bilharziase (*Schistosoma haematobium* und *mansoni*). [**Visceral Schistosomiasis** (*S. haematobium* **and** *S. mansoni*).] Reprinted from Ergebnisse der inneren Medizin und Kinderheilkunde. v. 2, N.S., 388–411, 10 figs. 1951. Berlin : Göttingen : Heidelberg : Springer-Verlag.

This is a general and excellent account of schistosomiasis mainly from the point of view of *S. haematobium* and *S. mansoni* and their pathological effects as encountered in Egypt. It is executed throughout with great thoroughness.

We would remark upon the section which treats of the pathological anatomy, and the excellent photomicrographs which illustrate it.

Special attention has been directed to the pulmonary manifestations about which no satisfactory account is to be found in any textbook and this section is adorned with most instructive radiographs of the lungs. One, in particular, illustrates an aneurysmal dilatation of the pulmonary artery (*cor pulmonale*). Considerable space is devoted to the differential diagnosis between eosinophilic lung and pulmonary schistosomiasis. *P. Manson-Bahr*

BUEDING, E. **Carbohydrate Metabolism of** *Schistosoma mansoni*. *J. General Physiol.* 1950, May 20, v. 33, No. 5, 475–95, 3 figs. [20 refs.]

Metabolic studies on this parasite have been made with a view to obtaining a lead in the synthesis of new therapeutic agents. For this purpose of study

schistosomes were removed from the portal and mesenteric veins of mice infected about 6 weeks previously with cercariae, were placed in saline solution at *p*H 7·7 and washed several times. The O_2 uptake, glucose used, glycogen content, CO_2 and lactic acid produced, were measured on 10 to 25 pairs of worms by methods previously described by the author [this *Bulletin*, 1949, v. 46, 763].

There was considerable variation in the metabolic activities of worms obtained from different batches of mice. Under aerobic or anaerobic conditions glucose was rapidly metabolized and as much as 15 to 26 per cent. of the weight of parasites disappeared from the medium per hour but was not converted to glycogen. Some of the sugar was oxidized to CO_2 and water but the chief product of metabolism was lactic acid. This acid was also formed from endogenous sources. Glycolysis was optimal in the *p*H range 7·3 to 8·7. After a period of anaerobiosis the rate of O_2 consumption was not increased under aerobic conditions as is common with other helminths under similar conditions. The male worm contains more glycogen and metabolizes it more rapidly than the female. When K^1 or Mg^{11} ions were added to a sodium salt mixture alone or in combination, metabolic activity and motility of the worms were increased and further enhanced by the addition of Ca^{11} ions. The inhibition of metabolism by arsenite was not prevented by thioglycollate or glutathione. Fluoride was an effective inhibitor but atebrin [mepacrine-quinacrine] was active only in high concentration and was ineffective therapeutically. Cyanine dyes, which are effective against *Litomosoides carinii* in the cotton rat, were strongly absorbed by schistosomes and depressed their respiratory but not glycolytic activity. These dyes were ineffective therapeutically in experimental infections. This fact suggested to the author that glycolytic processes in the parasite are of more importance than oxidative processes. Fuadin showed some therapeutic activity and inhibited glycolysis to varying extent while respiration was affected to a greater degree. The substance 2-methyl-1 : 4-naphthoquinone possessed therapeutic properties, but its activity was somewhat reduced through combination with the proteins in serum. A number of aldehydes also reduced respiration and glycolysis to a limited extent, but were not considered worthy of a clinical trial. The difference in metabolic activities of *L. carinii* and *S. mansoni* is discussed.

J. D. Fulton

BUEDING, E. & PETERS, L. **Effect of Naphthoquinones on** *Schistosoma mansoni in Vitro* **and** *in Vivo*. *J. Pharmacol. & Exper. Therap.* 1951, Feb., v. 101, No. 2, 210–29. [23 refs.]

The authors have previously observed that inhibition of the oxidative metabolic processes of *Schistosoma mansoni* was not fatal to this parasite and this fact suggested that energy was largely supplied by anaerobic processes [*Fed. Proc.*, 1947, v. 6, 313 ; this *Bulletin*, above]. In the present investigation, the chemotherapeutic properties of a number of naphthoquinones prepared by FIESER and co-workers [*J. Amer. Chem. Soc.*, 1948, v. 70, 3174] in their search for new antimalarials and others more recently synthesized, have been studied in mice infected with *S. mansoni* because they had been found to inhibit the glycolysis of this parasite. The substance 2-methyl-1 : 4 naphthoquinone was used as reference compound although therapeutically it was only effective in mice when given along with subcurative intraperitoneal doses of Fuadin (a trivalent antimonial). The degree of inhibition of glycolysis produced by related substances was calculated as the "antiglycolytic index", by dividing the molar concentration of the reference compound which produced a 50 per cent. inhibition of glycolysis by that of other compounds tested which produced a similar result.

The antiglycolytic properties of these naphthoquinones *in vitro* were found to be less in a medium containing serum, than in one containing salts only, because of the combination of the drugs with proteins. In the *in vivo* tests, mice infected 6 to 10 weeks earlier with cercariae were treated with the drugs in the diet but gave variable results and for that reason, Fuadin, in subcurative doses, which appeared to exert a synergic effect with naphthoquinones, was given at the same time, as noted above. In order to observe the results of drug treatment the mice were killed and examined 7 days after the end of drug treatment, and the presence or absence of flukes, their distribution and powers of glycolysis were noted. The ability of a number of substances tested to inhibit glycolysis of *S. mansoni* at low concentrations has been correlated with structure. None was found to show sufficient activity *in vivo* to warrant a clinical trial. The mechanism by which antiglycolytic activity is produced in schistosomes appears to differ from that in other parasites and is apparently unconnected with sulphydryl groups. *J. D. Fulton*

SCHWETZ, J. *Planorbis stanleyi* du Lac Kivu est transmetteur de *Schistosoma mansoni* [*Planorbis stanleyi* **of Lake Kivu is the Transmitter of** *Schistosoma mansoni*.] *Ann. Soc. Belge de Méd. Trop.* 1950, Sept. 30, v. 30, No. 3, 565–8.

By exposure of four mice to cercariae from naturally infected snails from Lake Kivu of the species *Planorbis stanleyi* [=*Biomphalaria alexandrina* var. *stanleyi* Smith, 1888], Schwetz demonstrated that this species is the vector of *Schistosoma mansoni* at Lake Kivu. All four mice were found infected at autopsy with adult male and female worms in the liver and mesentery.

J. J. C. Buckley

SCHWETZ, J. Sur la transmisson de *Schistosoma mansoni* par les planorbes fluviatiles du Congo oriental. (Troisième étude.) [**Transmission of** *Schistosoma mansoni* **by Riverine Snails in the Eastern Congo.**] *Ann. Soc. Belge de Méd. Trop.* 1950, Sept. 30, v. 30, No. 3, 585–93.

This is the third account of the author's transmission experiments with *S. mansoni* in the Congo. [See above, and this *Bulletin*, 1950, v. 47, 634]. The snails used were from two different localities, Bunia and Irumu, and are referred to under the general heading of "riverine snails" since the nomenclature of these forms is much involved and requires simplification. Suffice it to say that they differ from the snails of Lakes Albert or Kivu, *P. choanomphalus* and *P. stanleyi*, in that the shell lacks any keel.

The results of the experimental infection of mice are as follows: Exposure of three mice to a mixture of cercariae from several *Planorbis* collected at Bunia produced adult male and female *S. mansoni* in the liver and mesentery of one mouse in whose faeces eggs appeared 55 days after exposure. In the second mouse, autopsied after 90 days, numerous males, mostly immature, and no female worms, were found in the liver. The third mouse died after 70 days and could not be conveniently examined.

Exposure of four mice to a mixed batch of cercariae from several *Planorbis* collected in two streams at Irumu, produced infection in three—one having died prematurely. In the faeces of two mice, eggs were found on the 50th and 54th day respectively, and in the fourth mouse, which died on the 34th day, male and female worms were found in the liver and mesentery, but they were very young specimens. *J. J. C. Buckley*

ARDEL-MALEK, E. T. **Susceptibility of the Snail** *Biomphalaria boissyi* **to Infection with certain Strains of** *Schistosoma mansoni*. *Amer. J. Trop. Med.* 1950, Nov., v. 30, No. 6, 887–94. [13 refs.]

"A total of 254 laboratory-reared Egyptian snails, *Biomphalaria boissyi*, belonging to well-determined age groups remained uninfected when exposed to miracidia of the Puerto Rican strain of *S. mansoni*. However, some of these snails became infected when re-exposed to the Egyptian strain of the parasite. Thus, exposing them to the Puerto Rican strain did not give them immunity against infection with the Egyptian strain of *S. mansoni*, to which they are the known intermediate host.

"These experiments strongly support the view that *S. mansoni* endemic in one area may be physiologically distinct from the *S. mansoni* endemic in another region.

"*Biomphalaria boissyi* snails were susceptible to infection with the Egyptian strain of *S. mansoni* at all ages ranging from two weeks to five months. Differences were slight between the number of snails that shed cercariae at the various ages ; hence, apparently, the age of the snails had little or no influence on their susceptibility to infection.

"Dwarfed specimens of *B. boissyi* produced by overcrowded conditions in the aquaria showed considerably less susceptibility to infection with *S. mansoni* ; also, the incubation period of the parasite in the snail was increased to 49–51 days as compared to 28–34 days among normal individuals."

PESIGAN, T. P., PANGILINAN, M. V. & SARMIENTO, A. P. **Studies on Schistosomiasis : further Surveys in Mindanao.** *J. Philippine Med. Ass.* 1949, Sept., v. 25, No. 9, 417–33, 5 pls. (maps).

This 4th report of the schistosomiasis surveys in Mindanao [this *Bulletin*, 1947, v. 44, 1013 ; 1948, v. 45, 622 ; 1949, v. 46, 152] records the work done in the neck of the peninsula joining the Western wing of the island to the mainland, and in limited areas of the mainland. In all the places under investigation *Schistosoma japonicum* infections were found among the population, and the vector snail, *Oncomelania quadrasi*, was found in most of them. This survey enlarges the area of known endemicity of *S. japonicum* on Mindanao, and further emphasizes the importance of this parasite in the welfare of the island. *A. R. D. Adams*

TEN BERG, J. A. G. Schistosomiasis. Lever- en rectumslijmvliesbiopsie. [**Liver and Rectal Biopsy in Schistosomiasis.**] *Nederl. Tijdschr. v. Geneesk.* 1951, Mar. 31, v. 95 (i), No. 13, 968–75, 6 figs. (4 on pl.). [Refs. in footnotes.]

The English summary appended to the paper is as follows :—

"With reference to two patients of schistosomiasis (S. mansoni and S. japonicum respectively) localizations and symptomatology of the three forms of schistosomiasis that may occur in man as well as the parasite's life cycle are discussed.

"In the S. mansoni patient, liver puncture brought to light the true cause of the complaints and symptoms of the last 18 years, while this method of examination showed extensive liver localizations of S. japonicum in a seemingly healthy person. Moreover, biopsy of the rectal mucosa was mentioned as a method of examination which, just like liver biopsy, may be of great value in diagnostics, of rather old cases of schistosomiasis especially."

[A more detailed account of these two cases was given in this *Bulletin*, 1951, v. 48, 167.]

LICHTENSTEIN, B. W. & SIMON, A. **Cerebral Schistosomiasis producing Epilepsy in a Veteran of the Pacific.** *J. Neuropath. & Clin. Neurol.* 1951, Jan., v. 1, 81. [Summary taken from *J. Amer. Med. Ass.* 1951, Apr. 7, v. 145, No. 14, 1095–6.]

A 31-year-old Negro began to have repeated grand mal epileptic seizures after returning to the United States from a two year period of military service in Australia, New Guinea and the Philippines. Three years after onset he developed status epilepticus and died. At autopsy he was found to have diffuse parasitic meningo-encephalitis due apparently to the presence of numerous ova of Schistosoma japonicum in the meninges and brain substance. Similar ova were found in the liver. Since the natural habitat of the adult blood fluke is the venous circulation of the mesenteric, portal and pelvic systems, infestation of the tissues of the central nervous system is unusual. Neurological symptoms may appear (1) in the initial stage of the infestation, when the cercariae enter the blood vessels through the skin and are disseminated throughout the body, (2) during the deposition of ova in the brain by mature flukes or (3) as a result of chronic irritation from the deposited ova. The latter was responsible for the symptoms in this case. In some reported cases a localized granuloma has produced symptoms of brain tumor. The diagnosis of schistosomiasis with brain involvement is difficult but it should be suspected in patients who develop epilepsy after visiting endemic areas. Skin tests and serologic reactions may be helpful but are occasionally misleading. A negative stool examination does not exclude infestation. Aspiration of rectal crypts and biopsy of suspicious ulcers or polyps in the rectum or sigmoid should be performed in an attempt to find ova. Antimony compounds are useful in therapy.

BROUET, G., MARCHE, J. & LEPRAT, J. Epidémie familiale de distomatose à "Fasciola hepatica" traitée par l'antimoniate de N-méthyl-glucamine. [**Familial Fascioliasis due to** *Fasciola hepatica* **treated with Antimoniate of N-methyl-glucamine.**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1951, Nos. 1/2, 33–8.

The authors report on three persons infected with *Fasciola hepatica.* These were a man, his wife and his male cousin, who all ate cress from a stream in France in a meadow in which sheep were kept. Eggs of *F. hepatica* were found in the stools of all three patients. The husband's symptoms began 9 days, those of the wife 8 days, and those of the cousin one month, after the cress was eaten. Usually, the authors say, the symptoms appear three weeks after infection.

The symptoms and clinical examination of each case are given in detail, All three patients showed an eosinophilia (40, 68 and 78 per cent. respectively). Commenting on the symptoms and clinical examinations, the authors point out that the patients showed the major classical symptoms of this infection. The urticaria, usually seen early, was, in these cases, delayed for 6 weeks or 2 months. In the wife this skin reaction was accompanied by another allergic feature, namely nocturnal dyspnoea with cough and sputum resembling that seen during asthmatic crises, which persisted for a month. Usually in such cases there are, the authors say, transient eosinophil infiltrations of the lung recognizable only by radiology. The wife lost 12 kgm. in 4 months.

The patients were treated with N-methyl-glucamine [Glucantime]. The doses were 6 gm. a day (about 0·08 gm. per kgm.). It was planned to give these customary doses for 15 days, but all 3 patients showed symptoms of intolerance which made it necessary to stop the drug on the 10th day of treatment in each instance. The results of treatment with it were variable and deceptive. The

cousin alone seemed to have benefited by it : after 5 months he seemed to be cured. However the authors' experience suggested that while the results of treatment with this drug may seem at first encouraging, in that it caused disappearance of eggs of the fluke from the stools of the husband after a dose of 48 gm., the eggs reappeared in 6 months, making treatment with emetine necessary. In the stools of the wife eggs of *Fasciola* were still present after 48 gm. of antimoniate of N-methyl-glucamine had been taken and abdominal pains were still present. Emetine seemed to cure her, but this could not be proved.

The authors think that antimoniate of N-methyl-glucamine is not an ideal drug for treatment of these infections, because of its toxicity and the uncertain results obtained and that classic remedies, and especially emetine, still have a place in the treatment. *G. Lapage*

LEVINA, D. A. [**Fascioliasis of the Liver.**] *Klinicheskaja Medicina.* Moscow. 1950, Aug., v. 28, No. 8, 57–61. [In Russian.]

From personal observations on a number of human cases of infection with *Fasciola hepatica*, the author arrives at the following conclusions : (1) Clinically fascioliasis of the liver is characterized by three main features : pain in the region of the liver, high degree of eosinophilia, finding of the ova of the trematode in the stools and in the duodenal juice ; (2) the degree of eosinophilia depends on the number of parasites in the liver and on the duration of the infection, reaching a maximum in the initial stages of the infection ; (3) in the case of idiopathic eosinophilia, the differential diagnosis can be established by finding the ova of *Fasciola* ; if these cannot be detected but the liver is painful, a differential diagnosis can be made by tentative treatment with emetine ; (4) in all cases when pains in the liver are associated with marked eosinophilia, there is a suspicion of fascioliasis, and patients should be examined accordingly ; (5) emetine is specific for fascioliasis, the course of treatment consisting of 2 per cent. solution of emetine hydrochloride given twice a day in doses of 1·5 cc. (total daily dose 6 mgm.) for 8 days, after which the course can be repeated. *C. A. Hoare*

DESCHIENS, R. & POIRIER, M. Les lésions de l'intoxication expérimentale du cobaye par l'extrait de *Fasciola hepatica.* [**Lesions in Experimental Intoxication of the Guineapig by an Extract of** *Fasciola hepatica.*] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 697–9, 3 figs. on 2 pls.

A description, illustrated by 3 photomicrographs, is given of the histopathology of the lungs, liver and kidneys of guineapigs which had been inoculated with an extract of *Fasciola hepatica* [this *Bulletin*, 1951, v. 48, 571]. Commenting on these lesions, the authors state that they are due either to a toxic or toxogenic action of the extracts or to allergic effects which are secondarily toxogenic. The importance of the degenerative and necrotic lesions suggests that the main effect is toxic in origin but the nature of the lesions does not permit of a formal differentiation between toxic and allergic effects. The concept of toxic or toxogenic helminthic substances is based on the following arguments :—

1. Acute intoxication of experimental animals by certain helminth extracts occurs only with a given dosage and is seen in *all* animals tested, particularly those which are known never to have been previously infected and are not sensitized. These facts are incompatible with the idea of anaphylaxis or allergy.

2. The toxic effects are proportional to the dosage ; this again is contrary to the idea of anaphylaxis.

3. Extracts of certain helminths are only toxic if freshly prepared, whereas the sensitizing or anaphylactic properties of these extracts remain effective if the substance is kept for several weeks in the laboratory. *J. J. C. Buckley*

PICK, F. Sur la partie céphalique du trématode *Watsonius watsoni.* [**The Cephalic Part of the Trematode** *W. watsoni.*] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 706–8.

The following is a free translation of the author's summary in French :—

" (1) The body wall of *Watsonius watsoni* can form at the cephalic extremity a functional funnel ; (2) the pharyngeal bulb can be invaginated ; (3) the pharyngeal bulb can be turned outwards ; (4) the worm possesses several rows of apical papillae ; (5) depigmentation of the body begins always at the apical extremity but is reversible in conditions of direct oxygenation if it does not go beyond the cephalic part of the body ; (6) Mann's stain is effective in demonstrating the cytochromes of *W. watsoni.*" *J. J. C. Buckley*

PICK, F. Sur le mode de nutrition du trématode *Watsonius watsoni.* [**The Feeding Process of the Trematode** *Watsonius watsoni.*] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 708–11.

The following is a free translation of the author's summary in French :—

" A normal inhabitant of the large intestine, the trematode *Watsonius watsoni*, although attached to the intestinal mucosa, can move in the faecal environment by elongating the conical cephalic extremity. Suitable quantities of faecal material are taken in by the action of the functional cephalic funnel and pass back into the pharyngeal bulb. It appears that suction of the cephalic cavity helps to emulsify the faecal material contained in the pharyngeal bulb. At the level of the pharyngeal sacs the bacterial concentration is appreciably reduced and the staining reaction of the bacteria seems to indicate the action of diastases. The oesophagus contains only an amorphous mass with some foci of agglutinated bacteria. The caeca have a power of suction which is independent of that exerted by the cephalic cavity. The caecal contents are normally free of microscopically detectable bacteria ; the occurrence of bacteria in only one caecum must be due to a mechanical effect at the level of the bifurcation of the caeca. It is concluded that the absence of buccal armature and the complex feeding process adapted to the habitat of the fluke, prove that *W. watsoni* is a saprophytic feeder." *J. J. C. Buckley*

CHEN, H. H. & WU, P. N. **Incidence of Intestinal Helminthiasis in the Wu-Chia-Ling Area and Vicinity, Changsha, Hunan, with special reference to** *Fasciolopsiasis buski. Chinese Med. J.* Shanghai. 1950, May–June, v. 68, Nos. 5/6, 173–6.

As a result of the discovery of fasciolopsiasis in a small boy of eight years' a local survey of intestinal parasites was carried out. Fresh samples of faeces were collected from three groups of persons of various ages ; the samples were emulsified in saline ; and three smears of each were examined under the low-power objective of the microscope. The first group consisted of 156 persons from Wu-Chia-Ling, the second group 410 from the vicinity of the village, and the third group 208 from the neighbouring town of Changsha (Hunan). *Fasciolopsis buski* ova were found in 37·8 per cent. of the first group, in 4·6 per cent. of the second, and in none of the third. The children of the age groups 6 to 10 and 11 to 15 were most heavily infected.

Other worms found were hookworm (7·1, 3·7 and 0·9 per cent. in the three groups), *Ascaris lumbricoides* (over 80 per cent. in all groups), *Trichuris trichiura* (14·1, 11·7 and 0·5 per cent.) and a single strongyloid infection.

Ninety per cent. of the population are farmers. The water caltrop is grown in three large ponds where snails of the genera *Planorbis* and *Segmentina* are found. Most of this is consumed locally. There is in addition much more extensive cultivation of water bamboo. This crop is taken into Changsha for sale. In both cases human excrement is used for manure.

The water caltrop is consumed in the traditional fashion by removing the tough skin with the teeth. It is assumed that this is the main source of the infection, but the authors consider that it is possible that the bamboo plays some part. *L. E. Napier*

REDDY, D. G. & VARMAH, K. *Paryphostomum sufrartyfex* **(Intestinal Fluke) Infection in Man.** *Indian Med. Gaz.* 1950, Dec., v. 85, No. 12, 546–7, 4 figs. (3 on pl.).

Human infection with the echinostome fluke *Paryphostomum sufrartyfex* is extremely rare. It was first reported by Clayton LANE in a girl of eight in Assam. [This *Bulletin*, 1915, v. 6, 300.]

The present case is that of an ill-nourished and anaemic Hindu boy of 15 in Madras, with a history of diarrhoea and irregular fever for 2 months. He died in hospital 11 days after admission ; despite thorough clinical and laboratory examinations, the cause was not apparent.

Post-mortem examination showed evidence of marked malnutrition and anaemia. In the mucosa of the intestine, several thousands of small pinkish-white flukes were found. The fluke was identified as *P. sufrartyfex*. The morphology is described and illustrated in a drawing.

The suggestion is made that the heavy infection must have resulted from repeated ingestion of metacercariae from, probably, a mollusc, gastropod or fresh water mussel, on which the metacercariae were encysted. It is proposed to investigate the local epidemiology.

This appears to be the first such case recorded in South India.

H. J. O'D. Burke-Gaffney

GRIFFITHS, R. B. **A Review of the Incidence of** *Cysticercus bovis* **in Cattle in Great Britain, together with a consideration of some Aspects of** *Taenia saginata* **Infection in Man.** *Ann. Trop. Med. & Parasit.* 1950, Dec., v. 44, No. 4, 357–60. [15 refs.]

This useful account of a subject which has in post-war years become important and has received only moderate attention deals with published and unpublished records of *Cysticercus bovis* infection in cattle in Britain and records the author's observations on its incidence (1·86 per cent.) in 7,083 cattle slaughtered at Liverpool during a three-month period (March–June) in 1949. The question as to whether the post-war increase in the incidence is a real or apparent one is discussed and it is concluded that it is real but it cannot be said with certainty that it is still rising. There is evidence that a high proportion of the infected animals are home-bred and some are Irish-imported stock. The unsatisfactory state of knowledge as to the local distribution of the infections and the difficulties of tracing their origin are also discussed ; at most, they can be described as "widespread". "Nevertheless it seems reasonable to suggest that an effort might now be made to trace back infected animals bred, reared and fattened on single farms, in an attempt to clarify the present position regarding local incidence."

The situation regarding knowledge of the incidence and distribution of human infections with *Taenia saginata* in Britain is even more unsatisfactory, especially in view of the fact that the health authorities in Denmark have been able to produce ample evidence, based on data collected from Danish hospitals, that the incidence of the infection in the human population steadily increased during and after the war. This coincided with an increase in the *C. bovis* infections in Danish cattle. The author stresses the need for more information as to the incidence of the human infection in Britain and as to whether it is at present on the increase, for it would help to evaluate the efficacy of meat-inspection measures at present in operation. According to experience in Denmark, meat-inspection alone does not control *T. saginata* in man. [But in any case the responsibility and procedure for controlling both human and bovine infection should not be so one-sided. Control of the man-to-cattle part of the transmission cycle, which depends primarily on the diagnosis and treatment of all human tapeworm infections, should obviously be included in any prevention scheme.]

Sex incidence of human infection with *T. saginata* is discussed in the light of recent publications and other information. In Denmark the ratio is five women to one man and this preponderance of infection in women is confirmed by limited observations in Britain. The possible reasons for this curiously unbalanced sex ratio of infection are discussed. One point made is that the cysticerci tend to adhere to the skin surface and that the hands of housewives may be readily contaminated during the preparation of diseased meat.

J. J. C. Buckley

RAUSCH, R. & SCHILLER, E. L. **Hydatid Disease (*Echinococcosis*) in Alaska and the Importance of Rodent Intermediate Hosts.** *Science.* 1951, Jan. 19, 57–8, 1 fig.

"Although the status of hydatid disease in Alaska is in general poorly known, preliminary studies on St. Lawrence Island have disclosed, through skin tests with nonspecific *Echinococcus* antigen, a high incidence of human reactors." Positive reactions were obtained in two villages, on 20 per cent. of 126 persons and 28 per cent. of 106 persons respectively. There is also considerable clinical evidence of human hydatid infections. Although dogs were found in close association with man on the island, autopsy of 26 dogs proved negative for *E. granulosus*, but of seven arctic foxes (*Alopex lagopus*) examined, five were positive. The only obvious intermediate host for the fox infections is the reindeer, which however has not been killed for food for some years, so some other host was sought. Several species of rodents occur on the island and one of these, the tundra vole (*Microtus oeconomus inuitus*) was found infected with hydatid cysts, at the rate of 2 per cent. in 385 examined. No infection was found in 85 ground squirrels (*Citellus* sp.) ; the other rodents were not examined. In explanation of the possibility of the human infection from the arctic fox it appears that during the summer months the people of the island consume in the field an unidentified green plant, unwashed and raw. This could easily be contaminated by faeces of the arctic fox which occurs abundantly ; the epidemiology of the human infection however, requires further investigation.

J. J. C. Buckley

BLAKELY, E. R. & REID, J. D. **Hydatid Disease. Report of an Unusual Case.** *New Zealand Med. J.* 1951, Feb., v. 50, No. 275, 44–5, 2 figs. on pl.

"A case of hydatid disease is reported presenting with neurological signs at the age of 24, with spontaneous coughing up of a pulmonary hydatid and death due to cerebral infarction from impacted hydatid membrane in the middle

cerebral artery. This had arisen from a large hydatid of the myocardium, almost certainly present for ten years as judged by radiological evidence of calcification."

MATILLA, V., APARICIO GARRIDO, J. & PRIETO LORENZO, A. Estudios sobre anquilostomiasis. III. Nuestras observaciones sobre la epidemiologia en la vega del Jarama (Madrid). [**Studies in Ankylostomiasis. Observations on its Epidemiology in the Plain of Jarama, near Madrid.**] *Med. Colonial.* Madrid. 1951, Apr. 1, v. 17, No. 4, 293–347, 34 figs. & 2 folding coloured maps. [27 refs.]

The focus referred to is in the plain of the Jarama River, about 18 kilometres from Madrid. Between February 1950 and the present time [not indicated more definitely] more than 100 cases of hookworm infestation have been found in San Fernando and the district. The locality seems at one time to have been an important centre, but now comprises only about 1,300 inhabitants whose chief occupation is the cultivation of vegetable gardens, in which women take a large share of the work. Disposal of excreta is primitive ; it is mostly spread on the gardens and children play unrestrained in its proximity. The adults use a cheap kind of sandal at work but at home often go about barefoot. Personal hygiene largely is allowed to go by default and many wash themselves " only on important days such as the local festivals ". Clothes are washed in the huts and spread on the ground to dry, irrespective of the dung-heap close by. Alcoholism and venereal disease are rife ; whole families are syphilitic and they comment on family infection unashamedly ; illicit intercourse is so common that it is " practically the rule ". The birth-rate is high and is now almost double that of ten years ago ; in 1941 it was 18·6 per 1,000, in 1950 it was 36 ; male and female births are about equal. The climate is equable, with a long hot summer but moist, and, with the irrigation for the horticulture, is excellent for survival of *A. duodenale.*

The prevalence of infestation may be gauged by the fact that among 450 persons examined 100, or 22·2 per cent., were infested and in most only a single examination was made. Of the 100 positive, 38 were males and 62 were females, and 45 or nearly half were between 15 and 24 years of age. Forty-six harboured less than 500 worms, 28 had between 500 and 1,000 ; 10 had between 1,000 and 1,500 and the same number harboured 1,500 to 2,000, 4 had from 2,000 to 2,500 and 2 had still more. Other concomitant infestations were *Enterobius vermicularis* 24, twice with *A. duodenale* and *Trichuris*, and 22 with the former only of these ; *Trichuris trichiura* was seen in 13 ; in 11 with *A. duodenale* only and twice, as stated above, with this and *Enterobius. Ascaris lumbricoides* was found in six. That is, in 41 there was more than one form of helminthic parasite present. *H. Harold Scott*

WELLS, A. V. **Identity of Hookworm in the Throat.** [Correspondence.] *Brit. Med. J.* 1951, Apr. 28, 952.

Dr. Wells refers to his finding of worms *in copula* in the throat of a girl in St. Lucia [this *Bulletin*, 1951, v. 48, 176], which he describes as being a male and female *Necator americanus.*

He has now heard from Professor LEIPER, who raises the question of the worms being in fact specimens of *Syngamus kingi.* It is pointed out that a similar case was seen by KING in St. Lucia as long ago as 1913 and on that occasion Leiper identified the worms as specimens of *Syngamus* and named them *Syngamus kingi* [this *Bulletin*, 1913, v. 1, 441]. [Leiper thought it probable

that the presence of *Syngamus* in man was a purely accidental infection with a parasite common in one of the domesticated animals.]

Wells was not aware of Leiper's report when he recorded his case and unfortunately his specimens were not preserved, so that no re-examination of them has been possible. [It seems likely that the case is in fact similar to that reported by Leiper ; his report bore the title " Gapes in Man, an Occasional Helminthic Infection ".] *H. J. O'D. Burke Gaffney*

FAIRBAIRN, D. & REESAL, M. R. **Complete Elimination of Microorganisms from an Intestinal Parasite** (*Ascaris lumbricoides*). *Science.* 1950, Dec. 29, 792–3.

" The present communication describes for the first time a method by means of which axenic preparations of a common intestinal nematode may be made. This method is particularly useful in that microorganisms are eliminated completely from the parasite's intestinal tract, as well as from all other external surfaces. As a result, the nutrition and the excretion products of this species are now being studied under controlled conditions." [The detailed account of the method of procedure cannot easily be condensed and should be consulted in the original.]

LEGLER, F. Ueber eine neue Methode zur Zählung von Wurmeiern im Abwasser und im Stuhl. [**A New Method of Counting Worm Eggs in Sewage Effluent and in Stools.**] *Zent. f. Bakt.* I. Abt. Orig. 1950, May 25, v. 155, Nos. 5/7, 234–40, 1 fig. [19 refs.]

For the examination of the sewage effluent of Nuremberg for *Ascaris* eggs the author required a method of counting eggs in the total sediment in the fluid effluent. He used for this purpose a membrane filter, for the actuation of which a water pump is adequate. He claims for his method that all the worm eggs present remain on the filter and are visible as darkly-stained objects on a white ground.

The membrane disc of the filter (Model MA9, made by the Göttingen Membranfilter Gesellschaft) has a diameter of 9 cm. A measured amount of well-shaken effluent is put through the filter until there is a grey layer on the filter disc. The thinner this layer is the better the eggs can be seen. When the effluent contains much deposit, it must be diluted before it is filtered. For counting the eggs the author first cut the filter disc into strips and examined these under the microscope. Later he put the whole disc into a Petri dish and, with the help of a screen divided into 4 squares, he counted the eggs in a certain number of squares. He recommends the search of the whole disc, especially when the eggs are few and the centre should not be given more attention than the periphery, because the eggs are always a little fewer at the periphery. The filter membrane is microscopically homogeneous and it can, if necessary, be made more transparent by treatment with xylol. To prevent drying of the disc and of the deposit on it before counting, the disc can be kept in a moist chamber. If there is much deposit in the effluent, this can be broken up by shaking the effluent in a vessel with glass beads. The number of eggs on the filter disc is the number in the effluent examined.

For the examination of stools a weighed amount of stool (*e.g.*, 250 mgm.) is broken up in 30–50 cc. of water, left to stand and then, after vigorous shaking, with or without glass beads, filtered. A photomicrograph is shown of the filter disc with eggs from a stool on it. The best counts of eggs from stools are obtained by counting a large number of microscopic fields, rather than by

cutting up the filter disc. For this purpose it is necessary to know the size of the visual field of the microscope used and the author gives an example of how he calculates this and relates it to the area of the filter disc, so that the total number of eggs on the disc can be calculated.

Tables show the different numbers of *Ascaris* eggs found in the stools of ten patients when 4 counts were made on each stool, 250 mgm. of stool having been mixed with 50 cc. of water.

The author also used filter paper instead of the membrane filter disc. This he cut himself to the size of the filter disc. Ordinary filter paper is not so homogeneous as the membrane filter, but the author found it adequate for most of his studies. Its use was controlled by passing the filtrate sucked through the filter paper through the membrane filter. This showed that the filter paper had held back all the eggs. For special cases stools can be broken up in antiformin or antiformin-ether. To counteract fallacies in egg counts the author now uses 4 gm. of stool in 50 cc. of N/10 sodium carbonate solution. The author compares counts made by his method and by Zschucke's modification of Stoll's method and concludes that his method gives more consistent and usually higher counts. He also briefly discusses other methods that have been described. *G. Lapage*

RUTKOVSKIJ, L. A. [**Clinical Symptoms of Early Stages of Ascariasis.**] *Klinicheskaja Medicina.* Moscow. 1950, Aug., v. 28, No. 8, 49–53. [In Russian.]

From observations carried out in the course of three years on patients suffering from *Ascaris* infection, the author found that this infection was commonly associated with various other clinical conditions, especially bronchial asthma, atypical pneumonia and different forms of hepatitis. The correlation between ascariasis and other diseases was also studied statistically, from the medical histories of 124 cases of ascariasis, with the use as controls of the histories of 100 patients suffering from rheumatism. A comparison of the two groups showed that among patients infected with the nematode there was a much higher incidence of lobar and broncho-pneumonia, suspected tuberculosis, bronchitis and exudative pleurisy, than among the controls. It is noted that, since many of the symptoms of the above named diseases are characteristic of the early stages of ascariasis, they should be attributed to the latter. A detailed analysis of the available material has shown that the period of migration of the larvae is manifested by infiltration of the lungs and eosinophilia of the blood. To this may be added a pleural exudate with numerous eosinophils, due to penetration of the larvae into the pleural cavity. *C. A. Hoare*

WENZEL, D. G. & GIBSON, R. D. **A Study of the Toxicity and Anthelmintic Activity of n-Butylidene Chloride.** *J. Pharmacy & Pharmacol.* London. 1951, Mar., v. 3, No. 3, 169–76, 8 figs. [13 refs.]

" 1. The oral mouse LD50s of *n*-butylidene chloride, tetrachloroethylene and carbon tetrachloride are 4·5, 5·0 and 5·2 ml./kg. respectively. The differences were found to be within the range of experimental error.

" 2. *n*-Butylidene chloride was less hepatoxic than either carbon tetrachloride or tetrachloroethylene.

" 3. The value of a chronic liver toxicity determination, as indicated by an increased period of depression with sodium hexobarbitone, was corroborated by histological liver sections.

" 4. Carbon tetrachloride produced a flaccidity in *Ascaris*, while *n*-butylidene chloride and tetrachloroethylene caused an increased tonicity.

" 5. Vermicidal activity was in the descending order : Carbon tetrachloride, *n*-butylidene chloride and tetrachloroethylene.

" 6. Earthworms were not satisfactory test animals as they did not respond to *n*-butylidene chloride and tetrachloroethylene by increased tonicity and were markedly susceptible to all the agents tested."

CALLOT, J. & VERMEIL, C. Phagocytose péritonéale des helminthes et de leurs oeufs. [**Peritoneal Phagocytosis of Helminths and their Eggs.**] *Ann. Parasit. Humaine et Comparée.* 1950, v. 25, Nos. 5/6, 370–75.

The question of the viability of eggs of *Ascaris* in the peritoneal cavity of experimental animals (rats and guineapigs) was investigated by the authors, and also the results of implanting living or dead *Ascaris* in these animals. No development was observed in *Ascaris* eggs deposited by female worms implanted in guineapig or rat and eggs of *Fasciola* and *Taenia* when introduced into the peritoneal cavity of guineapig were destroyed by phagocytes. Living *Ascaris* remained alive for at least 7 days after implantation in a guineapig but generally they became encapsulated. In one experiment the worm was destroyed in the peritoneal cavity of a rat without undergoing this process. Dead *Ascaris* or fragments of dead worms were well tolerated by guineapig and underwent normal encystment with fibrous tissue. *J. J. C. Buckley*

BOWIE, J. H. **Filariasis.** *Edinburgh Med. J.* 1950, Dec., v. 57, No. 12, 561–71, 1 text fig., 3 figs. on pl. & 1 map.

" Since the testicle and epididymis have descended into the scrotum from the region of the kidney, lymph vessels are confined to the spermatic cord and proceed directly to the lumbar chain of glands ; there is no collateral circulation." Therefore acute filarial obstruction in the lumbar chain becomes obvious as a lymphangitis of the cord. Chronic obstruction will result in palpable lymph varices between the external inguinal ring and the testicle ; but since collateral lymph circulation is extensive from the leg, bladder and bowel, elephantiasis of these parts becomes a late manifestation of the disease. If the superior mesenteric lymph glands are obstructed, chyle may appear in the bladder, hydrocele sac and peritoneal cavity.

When the obstruction is sudden the result will be acute lymphangitis, and this generally occurs about a year after primary infection, more especially in the cord and epididymis and this extension is retrograde.

Filariasis has never previously been reported in Nepal. The Valley of Nepal is about 15 miles long by 13 miles wide and lies 6,700 feet above sea level ; it has a S. European climate and a heavy rainfall. Physical examination of 3,884 men was carried out and in 93 per cent. signs of filariasis were found, and in a further 4 per cent. microfilaraemia was present, making a total of 97 per cent. : on the other hand night blood-films of 600 Gurkha recruits from the surrounding mountains were negative. Two per cent. of *Culex fatigans* showed filarial larvae in various stages of development. Batches of *C. fatigans* were fed on Nepalese volunteers, and the larval forms appeared by the eleventh day.

In introducing this account of Bancroftian filariasis in Nepal, the author gives a short account of each of the various filarial infections and of the lymphatic channels concerned in filarial obstruction. *P. Manson-Bahr*

ABEN-ATHAR, J. Do mecanismo produtor de elefantíase na filariose (*Wuchereria-bancrofti*). [**The Formation of Elephantiasis in Filariasis** (*F. bancrofti*).] *Rev. Brasileira Med.* Rio de Janeiro. 1951, Feb., v. 8, No. 2, 89–94, 2 figs. English summary.

The author maintains that the generally held opinion that elephantiasis is due to lymphatic obstruction is wrong. In his view, destruction of a filarial

worm sensitizes the organism and the local reaction is of the nature of an allergy, an Arthus phenomenon. Histologically, in elephantiasis, as in experimental inflammation, there are marked subcutaneous oedema, hyperaemia, infiltration with lymphocytes and monocytes, degeneration of connective tissue with necrosis and swelling of collagen fibres ; the necrotic focus becomes organized, giving place to granulation and later to cicatricial tissue and to hardening of the skin, resulting in elephantiasis which is thus the result of a primary sensitization by the worm or the products of its disintegration and local anaphylaxis set up by the presence of an antigen in the subcutaneous connective tissue. [See also this *Bulletin*, HUNTINGTON *et al.*, 1951, v. 48, 488.]

H. Harold Scott

HUARD, P. & TRAN ANH. L'intradermo-réaction chez les filariens de Hanoi. [**The Intradermal Reaction in Human Filariasis in Hanoi.**] *Méd. Trop.* Marseilles. 1950, Sept.–Oct., v. 10, No. 5, 858–64. [18 refs.]

The intradermal reaction was used from May to September 1950 in the Yersin Hospital, Hanoi, for the diagnosis of filariasis. Two different antigens were employed—one prepared by the Institute Pasteur of Paris and the other by the National Institute of Health of U.S.A.

First the Institute Pasteur preparation diluted 1 : 500 was injected together with a drop of normal saline as a control. The American antigen, on the other hand, is injected together with some dog protein. The authors think that a control injection is necessary to avoid false reactions. Only those were tested who presented clinical aspects of filariasis. On the whole the French antigen appears to take longer to produce the maximum result, but the reaction lasts longer. Twenty out of 23 cases of haematochyluria gave a positive result and of these microfilariae were demonstrated in 13 at various examinations. In 15 cases of hydrocele, 10 positive reactions were found, one was doubtful and there were four negative.

In three cases of elephantiasis, with no microfilariae, the reaction was negative in two and doubtful in one.

The authors conclude that intradermal filaria antigen by reason of its sensitivity and specificity constitutes an important procedure in the diagnosis of filariasis.

P. Manson-Bahr

DEJOU, L., JONCHÈRE, H., KOERBER, R., LABAIL, P. & D'ALMEIDA, J. Les localisations génitales de la filariose de Bancroft en Afrique Occidentale française. [**Genital Localizations of Bancroftian Filariasis in French West Africa.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1949, v. 6, No. 2, 195–232, 4 pls. [33 refs.] [Also in *Méd. Trop.* Marseilles. 1950, Jan.–Feb., v. 10, No. 1, 31–60, 4 figs. [33 refs.]

This paper records researches undertaken in the Central African Hospital of Dakar. Altogether 152 persons were examined and of these 36 (23 per cent.) were infected with microfilariae ; 14 had *W. bancrofti* and 22 *A. perstans*. Of the *W. bancrofti* cases the microfilariae were nocturnal in 8 and non-periodic in 6. Microfilariae were found most commonly in the blood, but also in the "deep" lymph from spermatic vessels, and in the "superficial" lymph of lymph-scrotum as well as in hydrocele fluid.

The paper is reinforced with detailed descriptions of the lesions observed in the genito-urinary system as well as of their pathological structure. A novel feature has been the injection of tenebryl to show up the swollen lymphatics of the spermatic cord, as well as a large lymphatic reservoir in a case of lymph scrotum and its connexion with a series of enlarged inguinal lymphatic glands.

P. Manson-Bahr

WOODRUFF, A. W. **Destruction of Microfilariae of *Loa loa* in the Liver in Loiasis treated with Banocide (Hetrazan).** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Feb., v. 44, No. 4, 479–80, 1 fig. on pl.

The peripheral blood of an adult African patient showed the presence of microfilariae of *Loa loa* at a time when biopsy material taken from the liver did not reveal their presence. A chart [omitted at the time, but issued loose with the April number of the *Transactions*] shows the number of microfilariae per 20 c.mm. blood during the period of observation. Twelve hours after the administration of a single dose of 10 mgm. banocide per kgm. of body weight microfilariae had disappeared from the peripheral circulation ; at this time an examination of material from the liver, taken at a second biopsy, revealed the presence of larvae, most of which were surrounded by phagocytic cells. These results are in accordance with the view that banocide sensitizes the microfilariae which are then destroyed by phagocytes in the liver [HAWKING, this *Bulletin*, 1951, v. 48, 177].

R. M. Gordon

CRUSZ, H. & SIVALINGAM, V. **A Note on the Occurrence of *Gongylonema pulchrum* Molin, 1857, in Man in Ceylon.** *J. Parasitology.* 1950, Feb., v. 36, No. 1, 25–6, 1 fig. [13 refs.]

A male Ceylonese, aged 32, felt an irritation in his mouth between the left cheek and the lower jaw, as if something was moving about. He extracted a live thread-like worm. No subjective symptoms were felt.

The authors identified the specimen as an immature female of *Gongylonema pulchrum*, a nematode parasite which lives chiefly in the submucosa of the oesophagus of ruminants. The species has not hitherto been recorded from man in India, Ceylon or the Far East, nor has it been found in local ruminants in Ceylon.

Thirteen cases of human infection have already been reported from various countries [see, for example, this *Bulletin*, 1929, v. 26, 557 ; 1937, v. 34, 37].

There was nothing in the authors' case to suggest that the parasitism was not accidental, as it was in the cases already reported.

A description of the parasite is given and illustrated by two photomicrographs.

H. J. O'D. Burke-Gaffney

GAUD, J. & CHABAUD, A. G. Présence du nématode *Gongylonema pulchrum* chez l'homme, au Maroc. [**Human Case of Nematode *Gongylonema pulchrum* Infestation in Morocco.**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 1/2, 62–5.

These authors record the finding of two female specimens of *Gongylonema pulchrum* in the buccal mucous membrane of a woman of 24 in Morocco. This is stated to be the first case in Africa. Reference is made to the 14 cases noted above.

Detailed descriptions and measurements of the worms are given.

The authors suggest that it is possible that several cases involving the oesophagus or stomach may go unrecognized. *H. J. O'D. Burke-Gaffney*

BLÜMLEIN, H. Untersuchungen über das Vorkommen von Oxyuren im menschlichen Leichendarm. [**Study of the Occurrence of *Enterobius* in the Intestine of Cadavers.**] *Zent. f. Bakt.* I. Abt. Orig. 1951, Mar. 30, v. 156, No. 6, 462–4. [11 refs.]

The following is a translation of the author's summary :—

A study was made of the occurrence of *Enterobius* in the intestines of human cadavers. From a total of 82 cadavers studied in the spring and summer of

1947 *Enterobius* was found in 61 (75 per cent.). In individual cadavers the incidence of the worms was comparatively scanty. An average of 3 to 5 worms was found in each. No evidence of massive worm infestation could be observed.

The appendix was the commonest site.

The therapy of *Enterobius* infection is discussed. *H. J. O'D. Burke-Gaffney*

DEFICIENCY DISEASES

RAOULT, A. Le béri-béri. Etat actuel du problème. [**The Current Problem of Beriberi.**] *Méd. Trop.* Marseilles. 1950, Sept.-Oct., v. 10, No. 5, 737–812. [Numerous refs.]

This long memoir has clearly been written for the benefit of the young European physician proceeding to the Far East for the first time, who will derive from it much valuable information about this great disease. The major part of the memoir is devoted to basic biochemistry and pathology and to the clinical manifestations. These sections are well done.

Unfortunately the great opportunities before the French for preventive medicine are barely discussed. No mention is made of the possibilities for the introduction of legislative control of rice mills, or of the practice of parboiling rice before milling or of fortification of the grains with added vitamins. The potentialities of modern methods of health education in preventing beriberi are not considered. Much literature exists on these points. In short, this memoir is good as far as it goes, but it does not nearly finish the course.

R. Passmore

BERGERET, C. Quelques réflexions sur la cirrhose africaine. [**Some Reflections on African Cirrhosis of the Liver.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1950, v. 7, No. 1, 33–42.

An informative review with illustrative case histories, which will be especially valuable to European physicians proceeding to Africa for the first time. Nutritional and other factors in the aetiology are fully discussed. It is concluded that "if the non-alcoholic European or American generally escapes cirrhosis, it is that he receives, we believe, when he leaves his mother's breast or ceases to drink cow's milk, a diet adapted to his needs, which allows his liver to approach life like the happy bridge player with the maximum of trumps in his hand." *R. Passmore*

GRALL, A. La "Pellagre infantile" de l'enfant noir. [**"Infantile Pellagra" in the Negro Infant.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1950, v. 7, No. 1, 27–31.

Clinical descriptions are given of cases seen by the author in Dakar since 1937. Most were children aged between 9 and 24 months. The lesions of the skin and mucous membranes, and the digestive disturbances, resembled those described in kwashiorkor more closely than those seen in classical adult pellagra. It is concluded that nutritional factors are predominant in the aetiology, but "the lack of lipotropic amino-acids of the methionine type without doubt does not play an exclusive role." *R. Passmore*

AUFFRET, C. & TANGUY, F. Note sur la teneur en protides et lipides du foie chez quelques enfants atteints de kwashiorkor. [**A note on the amount of Protein and Fat in the Liver of some Infants with Kwashiorkor.**] *Bull. Med. de l'Afrique Occidentale Française.* 1950, v. 7, No. 1, 43–6.

Analyses were made of five livers from African children aged 2 to 4 years. The table shows the results.

	Fat per 100 gm.	Proteins per 100 gm.	Methionine per 100 gm. of liver	Methionine per 100 gm. of protein
Case 1	29·80	11·46	0·197	1·70
Case 2	21·32	16·10	0·283	1·75
Case 3	32·70	10·30	0·182	1·80
Case 4	38·10	9·40	—	—
Case 5	6·25	16·36	0·283	1·73

These infants were patients of Drs. Bergeret and Grall [see above], and had been subsisting on diets very poor in all animal proteins. The percentage of methionine in the protein both from liver and muscle in these cases was the same as that found in normal persons. *R. Passmore*

VENOMS AND ANTIVENENES

ERRATUM

In summary of CORKILL's paper, this *Bulletin*, 1951, v. 48, p. 68, line 14, for *Causas* read *Causus*.

BADANO REPETTO, J. L. Ofidismo. Diagnóstico y tratamiento. [**Snake-bites. Diagnosis and Treatment.**] *Arch. Uruguayos de Med., Cirug. y Especialidades.* 1950, Sept., v. 37, No. 3, 324–34.

In Uruguay the only poisonous snakes of importance are of the genera *Bothrops* and *Crotalus*. Of the former, *B. alternatus* (yara, yarara, or yararaca), *B. neweiedi*, *B. lanceolatus* and *B. atrox* ; of the latter, *C. terrificus*. Cases of poisoning by these are not numerous and most of the bites are by non-poisonous snakes. The symptoms of the toxic varieties are local and rapidly spreading oedema and haemorrhagic infiltration, early shock (and soon fatal if the poison enters a vein) ; then follow haemorrhage from nose, gums, stomach, intestine and kidneys and, especially with *Crotalus* poisoning, disturbances of vision to amaurosis, difficulty of speech and deglutition and paresis to paralysis. Blood changes are at first in the direction of erythropenia and leucopenia, but these are soon followed by leucocytosis to 50,000 per cmm. Later, nervous symptoms supervene—alteration of respiratory rhythm, of reflexes and of sensation, with haemoglobinuria and oliguria even to anuria.

Diagnosis should not be regarded as definite unless the signs of the bite are clear, for bites by *Latrodectus mactans*, stinging by scorpions and Hymenopterous insects, and even cutaneous anthrax, may give rise to similar symptoms.

Most of the cases of snake-bite in Uruguay run a favourable course and many recover without any specific antivenene treatment, but the idea of a " bite by a poisonous snake " is promoted by recovery after injection of serum, though it may have been administered several hours after the bite and the *post ergo propter* fallacy of recovery after any treatment fosters the idea that the bite was by a poisonous snake although such was not the fact.

The author is of the opinion that " at least 30 per cent. of those bitten would get well spontaneously without any treatment "—a fact which accounts for the recorded successes of domestic remedies. Study of the statistical returns reveals only 15 deaths in the 12 years 1935–1946 inclusive, by spiders, scorpions and snakes and only two of them due to the last-named. All that is needed in most cases is symptomatic treatment, rest, sedatives and local applications as for any wound. *H. Harold Scott*

KLEIN, W. E. & BRADSHAW, R. H. **Portuguese Man-of-War Sting.** *U.S. Armed Forces Med. J.* 1951, Mar., v. 2, No. 3, 509–12, 2 figs.

This paper records the case of a man aged 20 who, while swimming off North Miami Beach, was stung by a " Portuguese Man-of-War " [presumably *Physalia pelagica*] on the right forearm and scapular region. The characteristic weals are well illustrated in two photographs. In a few moments, difficulty in breathing and abdominal cramps occurred. Six or eight tentacles were removed from his arm and he was treated in hospital with injections of calcium gluconate, benadryl, epinephrine and atropine and local application of ammonia.

There was also a slight swelling of the right hand, with numbness and stiffness of the finger joints. Next day, there were no striking symptoms other than a moderate local itching. The itching, swelling and numbness disappeared within 3 days, but the lesion did not fade for about 3 weeks.

The chief interest in this case lies in the fact that the adherent tentacles were removed from the patient's skin by means of a towel. It is pointed out that such a method is to be recommended, as attempts to brush away the tentacles will only lead to further stings and perhaps more serious lesions.

The itching areas were treated with tetracaine ointment. This and the emergency measures proved effective and adequate.

H. J. O'D. Burke-Gaffney

DERMATOLOGY AND FUNGUS DISEASES

CLARKE, G. H. V. **Some Comparisons of Skin Diseases in Different Climates and Races.** *J. Trop. Med. & Hyg.* 1951, Mar., v. 54, No. 3, 49–53.

Figures have been obtained for Negroes in the temperate zones of the U.S.A. (HAZEN, *Arch. Dermat & Syph.*, 1935, v. 31, 317) and in Lagos, Nigeria ; for Europeans in Lagos, London, the U.S.A. (GOODMAN, *ibid.*, 1929, v. 20, 186), and for Indians in Calcutta [GHOSH, this *Bulletin*, 1949, v. 46, 570]. These series are not strictly comparable, but the tables give the incidence of skin diseases in different races and in varying climates. Lagos contains some 10,000 Europeans.

Effects of climate on the Negro skin.—The author remarks that in the comparison of tropical and temperate climates, specifically tropical conditions such as yaws and leprosy should be eliminated, even though both are almost certainly spread through defective hygiene. In both series in Negroes scabies and tinea

are the most common conditions, despite differences in hygiene and environment ; in the tropics impetigo, furunculosis and avitaminoses are more often met with, but acne, eczema, seborrhoeic dermatitis, tinea tonsurans, urticaria. and warts are commoner in temperate climates. Under temperate conditions, the Negro skin appears to approach that of the European, strong sunlight possibly thickening the keratin layer and protecting against eczema.

Effect of climate on the European skin.—The tropical series is to some extent selected, as those who do not stand the climate are usually invalided and here again the three series are not strictly comparable. In all three series, exogenous dermatitis and tinea are the commonest conditions and in West Africa pompholyx, furunculosis, lichen planus and vitiligo appear to be more frequent. In temperate climates acne, alopecia, eczema, lupus erythematosus, psoriasis, and rosacea are all increased, but the incidence of seborrhoeic dermatitis, urticaria and warts appears to be independent of climate.

Comparison of the white and black skin.—Tinea, furunculosis, lichen planus and vitiligo are increased in both races in the tropics and acne and eczema in temperate zones. The Negro is more liable to keloid, tinea tonsurans and the strictly tropical diseases. " From the point of view of skin diseases it would seem preferable to have a black skin ". The increased incidence of pediculosis in Europeans is possibly connected with the relative hairiness of the white man and the greater amount of clothes worn.

The brown skin.—The Indian series resembles that of the tropical African, the incidence of many diseases, *e.g.* scabies, tinea, avitaminosis, syphilis, and urticaria being similar. Leprosy appears to be relatively commoner, and peculiar to this series is the high incidence of vitiligo. The Indian skin is roughly midway between that of the European and the African.

The well-known rarity of thyrotoxicosis in the tropics, and Davies's hypothesis of oestrinization, may have a bearing on differences in the racial incidence of certain diseases. It is likely that the incidence of scabies, leprosy and avitaminosis in Africans could be reduced to the European level by improved nutrition and hygiene.

The author presents two tables giving detailed comparative figures for many skin diseases in the three racial groups. *C. F. Shelton*

ZENNER, B., BEUTNAGEL, J. & FRIEDERICH, H. C. Zur Diagnose und Therapie lichtbedingter oder lichtverschlimmerter Hautkrankheiten. [**Diagnosis and Treatment of Skin Diseases Induced or Aggravated by Light.**] *Deut. med. Woch.* 1951, Apr. 27, v. 76, No. 17, 578–82. [13 refs.]

HENTEL, W., NEWTON, J. K. & HORSMAN, R. K. **Acute Disseminated Coccidioidal Granuloma.** *Amer. Rev. Tuberculosis.* 1951, Apr., v. 63, No. 4, 476–9, 6 figs.

" The clinical and post-mortem findings in a case of disseminated coccidioidal granuloma are presented. Thè diagnosis was confirmed by isolation of *Coccidioides immitis* from blood withdrawn ante mortem."

ROSEN, E. & BELBER, J. P. **Coccidioidal Meningitis of Long Duration : Report of a Case of Four Years and Eight Months' Duration, with Necropsy Findings.** *Ann. Intern. Med.* 1951, Mar., v. 34, No. 3, 796–809, 2 figs. [20 refs.]

" 1. A case report of coccidioidal meningitis of four years and eight months' duration is presented, with clinical and necropsy findings. This is the longest reported duration for this disease.

"2. The correct diagnosis was not established until the fifth year of illness, despite extensive study during six previous periods of hospitalization in four different hospitals. Nevertheless, analysis of the patient's history and earlier hospital records revealed sufficient clinical and laboratory data to justify a clinical diagnosis of coccidioidal meningitis at an early stage of his disease.

"3. The subject of coccidioidomycosis is briefly reviewed, with particular stress on the diagnostic features of coccidioidal meningitis, and the methods of establishing this diagnosis."

TROPICAL OPHTHALMOLOGY

POLEFF, L. Procédé simple et ultra-rapide de coloration et de diagnostic des corps du trachome. [**Simple and Rapid Staining Method for identifying Trachoma Bodies.**] *Maroc Méd.* 1951, Feb., v. 30, No. 309, 107.

The author refers to the difficulties and disadvantages to be found in many of the methods used for staining trachoma bodies. He then describes a modification of Macchiavello's method, from which the basic fuchsin is omitted as being of little importance in the diagnosis of trachoma bodies.

The principal feature of this modification is, however, that the fixed smear from the conjunctiva is stained with a freshly prepared mixture of 1 per cent. methylene blue and 0·5 per cent. citric acid, for 3 minutes.

It is claimed that the method is rapid and effective and allows the appropriate bodies to be identified easily. The typical intracellular inclusions and the elementary bodies appear as a striking violet-red colour on a uniform blue background, while the initial bodies are to be distinguished by their much deeper blue colour. *H. J. O'D. Burke-Gaffney*

JAWORSKA-KOZAKOWA, Krystyna. Immunologiczne odczyny w jaglicy. [**Immunological Reactions in Trachoma.**] *Ann. Univ. Mariae Curie-Sklodowska.* Lublin. Sect. D. 1949, v. 4, Nos. 33/45, 633–45. [14 refs.] French summary.

The following is a translation of the author's summary :—

Studies have been made of immunological reactions in trachoma by blood and skin tests.

Since rickettsiae were found in trachomatous granulations, some workers studied the serological reactions by means of the Weil-Felix or Weigl tests, with doubtful results.

Others used the intradermal reaction with a special antigen. Most of the results were negative.

The present author tried an intradermal reaction with the use of an antigen prepared according to the technique of Professor Fleck. These inoculations produced no results. Also, she investigated a new reaction, in which antigen was inoculated under the conjunctiva. In 31 cases, no positive results were found. *H. J. O'D. Burke-Gaffney*

TROPICAL ULCER

MERLE, F. La pénicilline dans le traitement d'attaque de l'ulcère phagédénique. [**Penicillin in the Treatment of Acute Tropical Ulcers.**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 1/2, 110–16.

Though the author admits that penicillin injections are a "brilliant cure" for acute tropical ulcers, he claims that local applications are satisfactory and cheap for dispensary practice. After the ulcer is cleansed with a stream of boiled water it is swabbed dry. On its surface is then sprayed by means of a syringe about 10 drops of a solution of 200,000 units of crystalline penicillin dissolved in 25 cc. of subtosan (a 3·5 per cent. solution of polyvinylpyrolidone). A "cellophane" dressing is then applied and covered with cotton wool and bandaged. The whole is renewed every two or three days, and the cost is about 6 or 7 francs. [The amount of penicillin used appears to be about 4,000 units, but for what area it is not stated.]

Though pain, odour and discharge were soon controlled it took about 18 days before the base was clean. The use of skin grafts could, however, be started on the tenth day.

It is recommended that this method should be systematically used by all doctors. [A more energetic initial treatment would surely be a more economical and effective measure.] *C. C. Chesterman*

BIERZYNSKI, A. **Two Cases of Chronic (Tropical) Ulcers treated with Vitamin "E".** *Carribbean Med. J.* 1950, v. 12, Nos. 1/2, 5–6.

See also this *Bulletin*, 1951, v. 48, 368, AMPOFO & FINDLAY, **Oral Aureomycin in the Treatment of Tropical Ulcers and Cancrum Oris. Treatment of Yaws by Aureomycin. Chloramphenicol in the Treatment of Yaws and Tropical Ulcer.**

MISCELLANEOUS DISEASES

BAYLET, R. Enquête sérologique en milieu africain. [**A Serological Study in Africans.**] *Méd. Trop.* Marseilles. 1950, Nov.–Dec., v. 10, No. 6, 1039–50.

Serological tests were carried out on various groups of the population in the Haute Volta. The reactions used were the Hecht haemolysis, the Kahn standard, and the Meinicke clarification test. Syphilis was considered to be the cause of 37·5 per cent. of the positives, yaws of 15·6 per cent. and of the rest one-third proved to be transitory positives, one-third quite inexplicable and the other third due to leprosy, malaria or suspected syphilis. These equivocal results support the theory that the reacting substance in the serum, reagin, is non-specific and is found in small quantities in most normal samples of blood. It can be increased by a variety of conditions such as leprosy, malaria, trypanosomiasis, pneumonia and vaccination.

Reagin is considered to be associated with the α globulin fraction and an intermediate fraction between α and β globulin of the serum. A high proportion of the bloods were positive to the Gate, the Gros, the Takata Gros and the Maclagan tests, but alterations in the serum globulins bore no relation to treponematosis. Twenty children between 10 and 14 who had malaria parasites in the blood had negative tests by Kolmer, Kahn and Meinicke techniques. [It is not stated whether they had fever.] The author considers that in trypanosomiasis and leprosy, the number of false positive reactions is negligible.

C. C. Chesterman

MONNET, A. & BAYLET, R. Contribution à l'étude de l'état humoral de l'Africain. Résultats de sondages effectués en Haute-Volta. [**Humoral Study of Africans in the Haute-Volta Region.**] *Méd. Trop.* Marseilles. 1950, Nov.–Dec., v. 10, No. 6, 1051–61.

The technique of the following serum tests is described, together with the percentage of positive results among a mixed group of Africans in the Haute Volta.

Gate (Total globulins)	57·3 per cent. positive in 490 sera
Gros (γ globulins, large)	28 per cent. positive in 300 sera
Takata Gros (γ globulins, very large)	66·5 per cent. positive in 200 sera
Thymol (β globulins)	11·3 per cent. positive in 150 sera

Sedimentation tests were raised in only 10 per cent. of children under ten, but in 20 per cent. of those between 11 and 20 years and in 70 per cent. of adults. These tests all indicate an upset of the amount of γ globulins, but not of the β globulins. The total serum globulin is diminished in most of the population. This is apparently an acquired character and does not depend so much on differing diets, but is probably due to chronic malaria. *C. C. Chesterman*

FARINAUD, E., LÉVY, G. & GROS, R. Sur un cas de mélioidose à localisation pleuro-pulmonaire traité par la chloromycétine et la sulfadiazine. [**Case of Melioidosis with Pleuro-pulmonary Localization treated with Chloromycetin and Sulphadiazine.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 720–26, 5 figs. on 2 pls.

This is an account of the treatment of a case of melioidosis in a North African, aged 27 years, infected in Indo-China. After an acute onset, the illness pursued a severe febrile course with abscess-formation in the hilar region of the lung. Tubercle bacilli of low virulence for the guineapig were detected in the sputum, and *Pfeifferella whitmori* was isolated repeatedly from pus from the pleural cavity. Three courses of chloromycetin each of ten days' duration were given, the dosage in the first two being 3 gm. daily and in the third 6 gm. daily. Each course was followed by marked improvement but relapse occurred as soon as the drug was withheld. A fourth course of chloromycetin (3 gm. daily) was given, followed immediately by a ten-day course of sulphadiazine (5 gm. daily); throughout both courses, the patient also received 2 gm. of streptomycin daily. By the end of this period the patient was apyrexial and he rapidly made a complete recovery. Further courses of streptomycin and sulphadiazine were given.

It is considered that this is a case of melioidosis superposed on a low-grade tuberculous infection. The good results of treatment with chloromycetin are in accord with the expectations of GREEN and MANIKAR [this *Bulletin*, 1949, v. 46, 498] who showed that this drug was effective *in vitro*.

J. C. Cruickshank

PROTOZOOLOGY : GENERAL

WAHLGREN, F. Toxoplasmosens patologiska anatomi. [**The Morbid Anatomy of Toxoplasmosis.**] *Nordisk Med.* 1951, Mar. 7, v. 45, No. 10, 349–52, 4 figs. English summary.

The morbid anatomy of congenital toxoplasmosis is described from the autopsy examination of 6 cases of the disease. The body is often smaller than

normal, and there may be hydrocephalus, microcephaly, and micro- or macrophthalmos. The cerebrum is adherent to the dura and the ventricles are grossly enlarged, but the cerebellum and brain stem appear normal. There may be some enlargement of the liver and spleen, and pneumonia of varying extent. On microscopical examination the tissue surrounding the distended ventricles is seen to be necrotic and calcified and surrounded by a zone of inflammatory infiltrate containing eosinophils. The cerebellum and brain stem, although normal in external appearance, are full of foci of microglial proliferation, and thus present a strikingly different pathological picture from the cerebrum. Chorio-retinitis is commonly found, and its localization around the papilla indicates that the disease spreads from the brain along the optic nerve. Some histological changes of minor degree are usually found in all organs ; in one case the lungs showed pneumonia with necrosis and calcification. The pathological appearances described, although unusual, are not pathognomonic of toxoplasmosis, and may occur in the absence of serological evidence of infection ; the diagnosis must thus be confirmed in all cases by serological methods and animal inoculation. Biopsy specimens of lymph glands from 4 cases of toxoplasmosis which were also examined showed inflammation with swelling of reticular tissue and infiltration with eosinophils and plasma cells. This appearance is not specific for toxoplasmosis, but may suggest the diagnosis if encountered in the examination of an obscure febrile condition. *D. J. Bauer*

PIEKARSKI, G. Zur Parasitologie und Serologie der Toxoplasmosis. [**Parasitology and Serology of Toxoplasmosis.**] *Zent. f. Bakt.* I. Abt. Orig. 1950, July 15, v. 155, No. 8, Bericht pp. 375*–81*. [Numerous refs.]

The greater part of this paper is taken up by a review of the knowledge of the parasitology and serological diagnosis of toxoplasmosis [which has advanced considerably since the time of writing (1949).] Having obtained from Holland a strain of *Toxoplasma*, the author also carried out a number of serological investigations with the dye-test, with the object of determining (1) its specificity, (2) the frequency of positive reactions among an unselected population, and (3) the reactions among members of the families of infected persons. A detailed account of the results of this study will be published in another paper, but the preliminary results are given here in 4 tables. From these it is seen that the serological reaction is frequently positive among members of the family of the following groups : (*a*) children with positive dye-test, (*b*) children with toxoplasmic symptoms but with a negative dye-test, (*c*) adults with typical symptoms and a positive dye-test, and (*d*) patients with ocular symptoms but with a negative dye-test. *C. A. Hoare*

GARD, S. Toxoplasmosens laboratoriediagnostik och epidemiologi. [**The Laboratory Diagnosis and Epidemiology of Toxoplasmosis.**] *Nordisk Med.* 1951, Mar. 7, v. 45, No. 10, 352–7, 5 figs. [12 refs.] English summary.

The diagnosis of toxoplasmosis cannot be made clinically, but depends upon serological methods and isolation of the organisms. The parasites may sometimes be seen in smears, as in cerebrospinal fluid from the ventricles ; lumbar fluid may at the same time be free from parasites owing to blocking of the aqueducts. The diagnosis should in the first place be made by inoculating mice intracerebrally with biopsy material ; encephalitis develops and parasites can be found in the brain and identified by morphology and serological tests. The diagnosis can be confirmed by carrying out the dye test of SABIN and FELDMAN on the patient's serum, and also by the complement-fixation test with toxoplasmin as antigen. The latter test is said to become positive later

in the disease than the dye test, but the author describes two cases of laboratory infection in which the opposite was noted. The serological tests should be repeated at intervals, since the persistence of a high titre after 3 to 6 months indicates the continuance of active infection ; in such circumstances conception is contraindicated. Antibody can also persist in high titre for years, and a rise in titre must be demonstrated in order to establish the diagnosis. The skin sensitivity test with toxoplasmin was compared with the dye test in the examination of 310 pregnant women. Good agreement was found between the results of the two tests, which coincided in 88 per cent. of instances ; 34·8 per cent. of the patients gave positive results. The skin test is thus of value in carrying out immunity surveys. In an examination of groups of Stockholm inhabitants positive results were given by 169 of 371 men (45·6 per cent.) and by 238 of 513 women (46·4 per cent.). In children up to 9 years of age positive results were only obtained in cases of congenital toxoplasmosis ; the incidence then increases up to a maximum of about 50 per cent. by the 20th year. The findings of other workers indicate that the incidence is much lower in Northern Sweden ; in one series only 17 of 173 persons (9·8 per cent.) gave positive results.

D. J. Bauer

MAGNUSSON, J. H. Toxoplasmosens klinik. [**Clinical Aspects of Human Toxoplasmosis.**] *Nordisk Med.* 1951, Mar. 7, v. 45, No. 10, 344–9, 4 figs. [40 refs.] English summary.

A case of congenital toxoplasmosis is described, which occurred in a foetus aborted spontaneously in the third month of pregnancy ; the causative organism was isolated from the tissues by animal inoculation. The dye test titre in the mother's serum rose from 1/40 at the time of abortion to 1/250 five weeks later. Infection of the foetus thus occurs when the mother becomes infected early in pregnancy. A review is given of the literature on congenital toxoplasmosis, and it is pointed out that the diagnosis should not be made on clinical grounds alone, as other congenital conditions may give similar appearances. Eight cases of toxoplasmosis acquired in infancy are described, all of which were confirmed serologically. A 9-year-old girl showed no symptoms apart from vertigo. The remaining cases occurred in 6 women between the ages of 16 and 37 years, and a man aged 56. Two patients became infected during laboratory work. There was an acute febrile onset in 5 cases and glandular enlargement in 6 ; in 2 infectious mononucleosis was closely simulated. In 2 cases the disease was severe, with meningoencephalitis and myocarditis, and lasted for 6 months ; 1 presented a mild choroiditis. *D. J. Bauer*

CASSAMAGNAGHI, A. La haemoproteosis Nueva contribución para su conocimiento en el Uruguay. [**New Observations on Haemaproteosis in Uruguay.**] Reprinted from *Bol. Mensual Dirección Ganaderia.* 1950, July, Aug. & Sept., No. 3, 10 pp., 6 figs.

ENTOMOLOGY AND INSECTICIDES : GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

DAKSHINAMURTY, S. & SHARMA, M. I. D. **A Micro-Hygrometer.** *Indian J. Malariology.* 1949, June–Sept., v. 3, Nos. 2/3, 235–41, 2 diagrams.

This microhygrometer has been devised for use in connexion with insect feeding, breeding and resting places. It is simple, cheap and fairly accurate.

It consists of seven glass capillary tubes of 1 mm. bore, 10 cm. long, secured by rubber bands on to one side of a microscope slide so that 1 cm. projects beyond the ends of the slide. A piece of graph paper ruled in mm. is pasted on the other side of the slide. The tubes each contain a 50 mm. column of a " relative humidity mixture " of sulphuric acid and water, made for the relative humidities of 30, 40, 50, 60, 70, 80, and 90 per cent. respectively, and each tube is labelled accordingly.

The apparatus is left in place overnight and picked up next day for reading. The columns of liquid labelled below the relative humidity of the atmosphere being tested are lengthened and those above it are shortened, while those in equilibrium remain unchanged. Batches of sealed tubes can be stored and the two ends broken before use. The gradations may be made by 5 per cent. intervals instead of by 10 per cent. to obtain more accurate readings.

Examples are given showing the changes in length of the columns of mixture when kept in atmospheres of different relative humidities. *H. S. Leeson*

RAMSAY, J. A. **Osmotic Regulation in Mosquito Larvae : the Role of the Malpighian Tubules.** *J. Exper. Biol.* 1951, Mar., v. 28, No. 1, 62–73, 3 figs. [20 refs.]

GIAQUINTO-MIRA, M. **Notes on the Geographical Distribution and Biology of " Anophelinae " and " Culicinae " in Ethiopia.** *Riv. di Malariologia.* 1950, Oct., v. 29, No. 5, 281–313. [42 refs.]

The author presents an up-to-date list of the mosquitoes of Ethiopia [which is taken to include Abyssinia, Eritrea and Somaliland] for the information of doctors and others interested in public health problems. The list is compiled from reliable published sources and from the author's own observations during a period of twelve years investigations in the country. In the notes accompanying the list a few biological details are given but the main emphasis is on the geographical distribution, including several new locality records. Morphological details are omitted, except in the case of a new variety of *Anopheles macmahoni*, named by the author var. *barkhuusi*, and described from the larva alone.

Altogether 31 species and varieties of *Anopheles* and 44 culicines are listed. The following species are the most important as vectors of disease : malaria, *Anopheles gambiae*, *A. funestus* and *A. pharoensis*, some others are of local importance, while *A. pretoriensis*, *A. kingi* and *A. nili* should receive further study ; dengue, *Aëdes aegypti* ; yellow fever, *Aëdes aegypti*, *Aëdes vittatus*, *Aëdes africanus* and *Aëdes simpsoni*, while two species need more study, *Aëdes furcifer* and *Taeniorhynchus africanus*. *H. S. Leeson*

THURMAN, D. C., Jr. & MORTENSON, E. W. **A Method of obtaining an Index to *Aedes* Densities in Irrigated Pastures.** *Mosquito News.* 1950, Dec., v. 10, No. 4, 199–201, 1 fig.

For this purpose, the authors use a cloth flag one yard square with two sides tacked on to dowel sticks which allow the flag to be held rigid. The count is made within a square 2 feet by 2 feet marked on the flag. The operator walks 30 paces, stops, turns his back to the wind, spreads the cloth against his legs and counts the mosquitoes landing in 30 seconds on the leeward side. The procedure is repeated until the area is sufficiently sampled. Trials in the San Joaquin Valley, California, with cloths of different colours showed that the mosquitoes preferred dark grey cloth. *H. S. Leeson*

YATES, W. W. **Comparative Resistance of different Instars of *Aëdes* Mosquitoes to Chlorinated Hydrocarbon Insecticides.** *J. Econom. Entom.* 1950, Dec., v. 43, No. 6, 944–5.

In 1949, the comparative toxicity of DDT, TDE and toxaphene was determined on floodwater *Aëdes* mosquito larvae, consisting of approximately 95 per cent. *A. sticticus* (Meig.) and 5 per cent. *A. vexans* (Meig.). DDT and toxaphene were also tested against *A. dorsalis*. The larvae were reared at 80°F. by collecting soil from breeding areas where no control measure had been used, placing it in a pan and flooding it with water. Twenty-five first instar or 20 older larvae were placed in 300 ml. of water, to which the necessary amount of an acetone solution of insecticide had been added, and mortality counts made after 48 hours. Results are given below. *A. dorsalis* required higher concentration for equivalent kills of all instars than did floodwater *Aëdes*. The differences in susceptibility were more pronounced between second and third instars than between first and second or third and fourth.

Insecticide	Concentration P.P.M.	Floodwater *Aëdes*				*Aëdes dorsalis*			
		1st instar	2nd instar	3rd instar	4th instar	1st instar	2nd instar	3rd instar	4th instar
DDT ...	0·0005	93	—	—	—	6	—	—	—
	0·00125	100	99	0	—	59	68	—	—
	0·0025	—	100	49	20	—	74	42	—
	0·005	—	—	98	71	—	—	79	49
TDE ...	0·00125	90	3	—	—	—	—	—	—
	0·0025	100	45	15	—	—	—	—	—
	0·005	—	98	49	40	—	—	—	—
Toxaphene	0·00125	49	29	—	—	37	46	—	—
	0·0025	87	51	20	5	—	65	—	—
	0·005	—	96	21	10	—	—	67	50
Untreated checks...	—	3	10	7	5	4	20	10	10

Per cent. mortality in 48 hours of different instars of *Aëdes* mosquitoes exposed to acetone solutions of DDT, TDE and Toxaphene.

The results show that field control of mosquito larvae will be better, and that less toxicant will be required, if treatment is performed while larvae are in the first or second instars. They also show why pretreatment of breeding areas before flooding has proved successful. *Thomas E. Fletcher*

MAGY, H. I., DAHL, A. H. & GEIB, A. F. **Spray Plane Applications of Larvicides for Control of *Aedes* in Flooded Pastures in California.** *Mosquito News.* 1950, Dec., v. 10, No. 4, 205–9.

Experimental air-spraying treatments of flood water against *Aëdes dorsalis* and *Aëdes nigromaculis* were made in two districts of California. The aeroplanes used were a PT-17 Stearman (90 m.p.h.) and an Aeronca Champion (80 m.p.h.); both were fitted with spray booms mounted below the wings. The effects of treatments were assessed by dipping for larvae 2–4 hours before and 24 hours after treatment, special note being made of 3rd and 4th stage larvae. In all tests, the insecticide was applied at 0·4 lb. per acre.

The results indicated the following differences in the insecticide efficiency :— DDT water emulsion was consistently better than DDT in diesel oil and also better than DDD (dichlor diphenyl dichlorethane) emulsion. One half-gallon of 10 per cent. larvicide was equally as effective as one gallon of 5 per cent., which enables a larger load to be taken by the plane on each trip.

When all treatments for the areas of favourable vegetation were averaged, the following general points were noted. Effectiveness of the treatment increased with reduction of temperature, increase of relative humidity or reduction of *p*H of the water. Spraying was more effective before 10 a.m. than it was later in the day, and larvae in deeper water were killed more easily than those in shallow water (possibly because the deep water was cooler).

J. R. Busvine

YATES, W. W. **Effect of Temperature on the Insecticidal Action of Mosquito Larvicides.** *Mosquito News.* 1950, Dec., v. 10, No. 4, 202–4.

Certain mosquito control agencies have reported that the temperature prevailing at the time of treatment appears to affect the efficiency of larvicides. To investigate this, the author tested several insecticides at two temperatures (63°F. ; 17·5°C. and 93°F. ; 34°C.) against various species of *Aëdes* and *Culex*. The mosquitoes were captured wild as eggs (*Aëdes*) or young larvae (*Culex*) and reared at 80°F. (27°C.), to fourth instar in the laboratory for test. They were put at the experimental temperature 24 hours before treatment. The tests were done by exposing batches of larvae to dilute suspensions made by adding small quantities of acetone solutions of the insecticides to water. Concentrations of 0·002 to 0·01 p.p.m. were employed.

The results showed that DDT was consistently more toxic at the lower temperature than at the higher one and so were three DDT analogues and gamma BHC. Parathion was more toxic to all species at 93°F. than at 63°F. and dieldrin and aldrin were also more toxic at the warm temperature towards *Aëdes* spp. Toxaphene and chlordane were about equal at both temperatures. The species used were : " floodwater *Aëdes* " (*A. vexans* and *A. sticticus*) ; *Aëdes nigromaculatus* ; " mixed *Culex* " (*C. stigmatosoma, C. pipiens* and *C. tarsalis*).

J. R. Busvine

DE BUSTAMANTE, F. M. & GUSMÃO, J. B. Observações com um larvicida à base de DDT. [**Observations on the Use of a Larvicide with a DDT Base.**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1950, Oct., v. 2, No. 4, 328–38, 2 figs. English summary.

The larvicide investigated was mainly composed of 25 per cent. DDT in Xylol, prepared for application in a novel way, by a commercial firm in Florida. Five-gramme portions of the larvicide were enclosed in small gelatinous capsules, constricted in the middle by a band. When these are thrown into water, they swell and burst in about 10 minutes, liberating the larvicidal contents. It is claimed that these render application of larvicide very simple : dosing is done by adding suitable numbers of capsules according to the size of the mosquito-breeding site.

The method was tested on a number of natural breeding sites containing anopheline larvae [species not recorded]. The pre-treatment and post-treatment numbers were assessed by dipping counts. Tests were made with dosages from 13 mgm. to 1·6 gm. per sq. metre (0·11 to 14 lb. DDT per acre). The length of the effective larvicidal period was judged by the time before the appearance of moderate and large larvae, which compared with dosages as follows : 13 to 33 mgm./sq. metre, 11 to 17 days ; 35 mgm./sq. metre, 17 days ; 70 to 250

mgm./sq. metre, 19 to 23 days. None of the doses was, however, toxic to pupae, which were always present for a few days after treatment. In one site where 35 mgm./sq. metre were applied, small fishes were killed.

J. R. Busvine

PIMENTEL, D., SCHWARDT, H. H. & NORTON, L. B. **New Methods of House Fly Control in Dairy Barns.** *Soap.* New York. 1951, Jan., v. 27, No. 1, 102–5, 112A–112C, 141, 5 figs.

Houseflies in dairy barns in the United States have, in many cases, become resistant to insecticides. This has led to the belief that disposal of waste or of any material in which flies breed is a better means of fly control than the use of insecticides. This paper reports that in 6 barns with excellent waste disposal, satisfactory fly control was not achieved. The period of effective control in barns with waste disposal of this high degree and treated with lindane wettable powder, however, was at least twice as long as in barns similarly treated with insecticide, but with only normal waste disposal. There was no evidence of the development of resistance to lindane or toxaphene by flies collected from barns after one and two seasons of spraying.

Strips of window screening treated with insecticide and placed 2 feet apart across the ceilings of barns gave good fly control. Strips treated with 15 per cent. dieldrin were particularly successful, and gave control for 4·5 to 9 weeks.

[For results of overall treatment of barns with other insecticides see PIMENTEL *et al.*, this *Bulletin*, 1951, v. 48, 413.] *C. M. Harrison*

FAIRCHILD, G. B. & TRAPIDO, H. **The West Indian Species of Phlebotomus** (*Dipt. Psychodidae*). Reprinted from *Ann. Entom. Soc. America.* 1950, Sept., v. 43, No. 3, 405–17, 2 pls.

Before 1938, sandflies of the genus *Phlebotomus* were not known to occur in the West Indies outside Trinidad, but several records since then have made it advisable to make further investigations. A rapid survey was made in May and June 1949 and resulted in specimens being taken in Jamaica, Cuba, Haiti and the Dominican Republic. No evidence was obtained that the species of *Phlebotomus* in the West Indies feed on man. No one recognized them and there were no local names for them. The blood found in them was probably from lizards.

Keys are given for the identification of males of six species and females of five. Four new species and two new sub-species are described. Male genitalia and female cibaria and spermathecae are figured. *H. S. Leeson*

FLOCH, H. & ABONNENC, E. Les phlébotomes américains. Clef d'identification de 97 femelles connues. [**American** *Phlebotomus*. **Key to the Identification of 97 Known Females.**] *Ann. Parasit. Humaine et Comparée.* 1951, v. 26, Nos. 1/2, 99–117, 95 figs. on 7 pls.

LE GAC, P. Découverte d'acariens du genre *Thrombicula* en Oubangui-Chari (A.E.F.). [**Discovery of a** *Trombicula* **in Oubangui-Chari.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 11/12, 711–14. [10 refs.]

Hitherto Trombiculid mites have not been found in Tropical Africa, although the related family, Trombidiidae, are known from various parts of Africa. The author reports the discovery of mites of the genus *Trombicula*, probably consisting of two new species, in French Equatorial Africa. The mites are being determined by M. Marc ANDRÉ.

The mites were found on various rodents and the author suggests that Trombiculids may play a part in the transmission of the *typhus des savanes* which resembles oriental mite typhus in many respects. The importance of the rôle they play is perhaps a little doubtful, as the author has spent ten years in searching for Trombiculids. *J. H. Sudd*

CHABAUD, A. G. L'infestation par des Ixodinés provoque-t-elle une immunité chez l'hôte ? (2me note). [**Do the Bites of Ixodids confer an Immunity on the Host** ?] *Ann. Parasit. Humaine et Comparée.* 1950, v. 25, Nos. 5/6, 474–9.

In some cases attack by ticks may confer an immunity on the host which reduces the proportion of ticks which feed fully [see TRAGER, this *Bulletin*, 1940, v. 37, 233] ; this immunity is specific for the tick in question. Those Ixodids with long rostrums (*e.g.*, *Hyalomma*) are less active in producing immunity than those with short rostrums (*e.g.*, *Dermacentor*, *Haemaphysalis*, *Rhipicephalus*). The species of host is also important. *Rhipicephalus sanguineus* confers a total immunity on the guineapig, a partial immunity on the rabbit and little or none on the dog. In the guineapig, immunity induced against *Rhipicephalus sanguineus* is not effective against *Dermacentor pictus*.

J. H. Sudd

COLLINS, D. L. & NARDY, R. V. **Effects of DDT Spray Residues on Larvae of the Tick** *Dermacentor variabilis*, **Say.** *J. Econom. Entom.* 1950, Dec., v. 43, No. 6, 861–3.

In some DDT spray experiments on roadside vegetation to control the tick *Dermacentor variabilis*, Say., no reinfestation over a long period was observed. This suggested that the spray residue may have affected the tick larvae which hatched in the area subsequently to spraying.

During 1948 and 1949, plots in a grassy field were sprayed with DDT emulsion at the rate of 1, 2, 5, 7, 10 and 20 lb. of DDT per acre. After up to six weeks of weathering, tick larvae were exposed in glass vials to grass, collected by snipping clumps close to the ground, from one untreated and the six treated plots. Mortality counts were taken after 24 hours. Dosages of 1 and 2 lb. per acre were ineffective at the end of the first and second week respectively, while dosages of 5 and 7 lb. were effective for five weeks, and 10 and 20 lb. effective at six weeks.

After the first few minutes of activity, following their placement on grass, the larvae almost invariably clustered together on one or two blades of grass where they remained for the 24-hour period, thereby limiting their exposure to the DDT. It is possible that under natural conditions in search for a host the larvae would be more active and contact residues more often. Therefore it is possible that DDT applied topically at the rate of 5 lb. per acre to control adult ticks directly would have the additional and indirect effect of limiting reinfestation by killing by residual action the larvae of ticks hatching subsequently to spraying. *Thomas E. Fletcher*

HADAWAY, A. B. & BARLOW, F. **Studies on Aqueous Suspensions of Insecticides.** *Bull. Entom. Res.* 1951, Feb., v. 41, Pt. 3, 603–22, 2 figs. on pl. [18 refs.]

Ground crystalline insecticides were carefully fractionated into different size ranges, usually 0–10, 10–20, 20–40, 40–80 μ. They were made up in aqueous suspension and sprayed evenly on to blocks of plaster of paris, etc., at different deposit rates. Their insecticidal effects were judged from the mortalities of mosquitoes (*Aëdes aegypti*) exposed for short periods to the treated surfaces.

The results indicated that, with DDT and two of its analogues, the smaller crystals were more effective than larger ones, not only at equal deposit weights, but even with equal numbers of crystals per unit area. The reason for this is that smaller crystals adhere much better to the legs and feet of the mosquito. With plaster blocks the most efficient size range was 10–20 μ, but with dried mud blocks and fibre board the very smallest range was the most effective. The effectiveness of dieldrin and gamma BHC was much less influenced by size than the DDT compounds. This is possibly because these two insecticides are more intrinsically toxic and their effect may depend on only one or two particles picked up by the insect.

Tests with deposits of 10–20 μ crystals of DDT at different rates on plaster blocks, showed that already at 3 mgm. per sq. ft. complete efficiency for a short exposure was achieved. No greater kill was obtained by increasing the deposit above this figure.

Experiments with DDT suspensions mixed with various inert ingredients showed that the size and nature of the inert materials was comparatively unimportant, but all of them progressively reduced the efficiency of the DDT according to the amount of diluent present.

Tests in which the same deposit of DDT was applied to various substances, showed a great variation in availability of insecticide according to the nature of the surface. Thus, a suspension of DDT on glass dries up, and the wetting agent tends to stick the crystals to the glass ; on a porous surface the water and wetting agent are absorbed, and leave the crystals readily available for action.

J. R. Busvine

CROWELL, R. L. & FAY, R. W. **Preliminary Experiments in the use of Hot DDT and other Halogenated Hydrocarbons for Residual Applications.** *J. National Malaria Soc.* 1951, Mar., v. 10, No. 1, 8–16, 2 figs.

This paper describes the development of a new method of applying films of residual insecticides, by spraying them in a liquid condition. The elimination of solvents and other diluents prevents much staining and smearing of highly finished interiors and the method is particularly suitable for applying residual insecticides inside aircraft. DDT and some of its analogues may be liquefied at 97°C. (commercial grades) ; chlordane also requires this temperature to reduce its viscosity. Aldrin and gamma BHC require higher temperatures (120° and 135°C.) while toxaphene and dieldrin tend to decompose before they can be adequately melted for this purpose. However, this may be overcome by addition of similar compounds to form semi-eutectic mixtures.

The temperatures are most satisfactorily obtained by electric heaters, thermostatically controlled, built into the sprayer. The spraying is done by compressed air, through a very fine nozzle delivering 0·017 (U.S.) gallons per minute. This allows convenient application of a 200 mgm./sq. ft. deposit.

The deposits produced by this spraying method were tested for efficiency, by exposing houseflies to them for 15 minutes and determining the mortalities produced. All gave 97 to 100 per cent. kill in 24 hours ; in addition, the DDT analogues and *gamma* BHC gave a good initial knock-down, though chlordane, aldrin and heptachlor failed to do this. The high residual toxicity of the films produced by melted DDT remained in panels, vibrated in a special machine for up to 100 hours. A table is given of the effectiveness of the DDT deposits on a range of materials used in aircraft. Poor results were only obtained on plastic-covered fabric. There were virtually no deleterious effects on the appearance of the various surfaces after treatment.

A few experiments were done with DDT films of this type compared to residues from suspensions and emulsions of DDT. including an emulsion containing

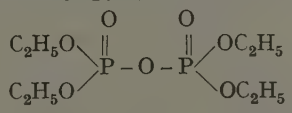
resin. These films were exposed to weathering for 1–12 weeks and tested at intervals. It was found that the one containing the resin was most persistent, with the melted-DDT type next. *J. R. Busvine*

i. PLAGNOL, H. Le parathion. Ester phosphorique insecticide. [**Parathion, a Phosphone Ester Insecticide.**] *Méd. Trop.* Marseilles. 1950, Sept.–Oct., v. 10, No. 5, 865–73. [13 refs.]

ii. ROMAN, E. & RINAUDO, E. Action sur les larves du moustique citadin des esters phosphoriques organiques. [**Action of Organic Phosphoric Esters in the Larvae of Urban Mosquitoes.**] *J. Méd. de Bordeaux.* 1951, Jan., v. 128, No. 1, 256–7.

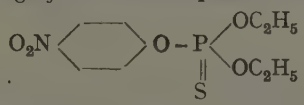
i. Some very highly toxic phosphorus compounds have been developed as insecticides during the last decade, particularly by the work of SCHRADER in Germany. [For details, see F.I.A.T. *final report* No. 949, 1946 ; RIEMSCHNEIDER *Die Pharmazie* 1948, v. 3, 506 ; and EATON, *Nature*, 1949, v. 163, 496.] The author discusses the properties of some of the most promising of these new insecticides.

The substance H.E.P.T. (hexa-ethyltetraphosphate) has now been shown to be (in commercial preparations) a complex mixture, of which the insecticidally effective principle is tetra-ethyl pyrophosphate, or " Tepp."



This is highly effective against red spider and aphids at concentrations of 1 /5,000 to 1 /20,000. It tends to hydrolyse rapidly to a non-toxic compound. It is highly toxic to mammals, the lethal doses for mice being : subcutaneous 0·7 to 1 mgm. /kgm. and cutaneous application 50 mgm. /kgm.

Parathion is another highly effective compound, with the formula :



It is soluble in esters, ethers and alcohols, but sparingly in most other hydrocarbons and scarcely so in water.

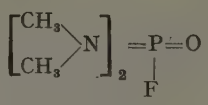
Like " Tepp," it is readily hydrolysed to an inactive compound, especially in alkaline media. It can be sprayed safely on plants at a concentration of 0·1 per cent., though dipping the plants in this solution causes leaf damage. The insecticide is absorbed into the plant and kills insects feeding on it, but soon decomposes and leaves fruit etc. safe for eating. [*Sic*, but there is on record an accident in California, where many people became severely ill from merely picking pears sprayed 10 days earlier with parathion.]

The author contrasts the action of parathion with that of DDT and gamma BHC. He states that it is from 5 to 25 times as insecticidal as DDT.

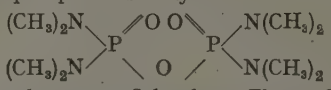
Though parathion is somewhat less toxic to mammals than other phosphorous insecticides, it is more stable and hence there is more danger of cumulative toxicity. The lethal dose for mice (subcutaneous) is 25 mgm. /kgm. ; but a daily dose of 1–2 mgm. /kgm. caused death in 6 to 10 days. The effect of 30 mgm. by mouth on man was unpleasant with gastric sensations but nothing else ; other symptoms of intoxication are giddiness, vomiting, abdominal pains and loss of consciousness. Atropine is used as an antidote. [Full

instructions for users of these insecticides with precautions, etc., have been issued by the Agricultural Research Council.]

Other insecticides of this type which have shown promise are bis-dimethylamino fluoro-phosphoside



and bis-dimethylamino-phosphorous anhydride



[which will probably be known as Schradan. The author seems to have got both the chemical name and formula slightly wrong].

ii. The authors of the second paper describe some *ad hoc* tests with one of the phosphorous insecticides for the purpose of destroying larvae of *Culex pipiens autogenicus* breeding in cesspools in Lyon. They found that an emulsion of 15 per cent. "Thiophos" [parathion] diluted to 1 : 10 million, killed all larvae in 10 hours and at 1 : 100 million it killed them in 2 days. It was thus much more toxic than DDT, which requires a concentration of 1 : 750,000 to 1 : 1 million. These tests were done in the laboratory ; a further test was done in practice, with a 3-basin urinal (each of 2 litres and running one into the other at 300 ml. per day), into the first of which parathion was added to give a concentration of 1 : 50 million. All larvae were killed within 3 days, but not those which had become nymphs at the time of the test. Parathion at 1 : 1 million did not harm the aerobic or anaerobic bacteria so essential in a septic breeding site.

The authors conclude that parathion, despite its toxicity for man, may be particularly valuable if these *Culex autogenicus* larvae become resistant to DDT as suggested by findings of MOSNA in Italy in 1948 [*Bulletin of Hygiene*, 1949, v. 24, 790]. *J. R. Busvine*

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

NATURE. 1951, Apr. 7, 542–3, 1 fig. **West African Institute for Trypanosomiasis Research.**

The opening, on January 31st, 1951, of the West African Institute of Trypanosomiasis Research in Nigeria is an important new development in the provision of facilities for scientific research in West Africa on one of its major scourges, trypanosomiasis. The opening ceremony was performed by His Excellency Sir John Macpherson, Governor of Nigeria, in the presence of a large representative gathering including delegates from scientific and academic bodies in the United Kingdom and Africa itself.

The buildings are located at two centres. One of these, at Vom, in the Plateau Province, is in an area free from tsetse and therefore excluding local cyclical transmission of trypanosomiasis, while the other at Kaduna, in Zaria Province, lies in an endemic area.

The Institute marks the fruition of recommendations made by Professor T. H. Davey of the Liverpool School of Tropical Medicine after an extensive tour in West Africa in 1945 made on the initiative of the Tsetse Fly and Trypanosomiasis Committee in London. Professor Davey wisely recognized

the essential relationship between the problems of human and animal trypanosomiasis and advised the establishment of an inter-territorial organization to undertake research on all aspects of trypanosomiasis. His recommendations were quickly implemented under a Colonial Development and Welfare Research Scheme providing £300,000 for capital and recurrent expenditure over an initial five-year period.

The carrying out of this scheme was entrusted to Col. H. W. Mulligan, lately retired from the Indian Medical Service and formerly Director of the Central Research Institute, Kasauli.

The Institute, with its two centres at Vom and Kaduna, has now been completed and marks a very considerable achievement, even on a purely administrative and organizational level, on the part of the Director. The Vom centre has two sections, devoted to Protozoology and Veterinary Trypanosomiasis, while at Kaduna are sections devoted to Entomology and Epidemiology. Both centres are equally provided as regards accommodation, the Vom centre being all on ground level while the Kaduna one has one double-storey building and one on ground level. The laboratories are large spacious rooms, well equipped with laboratory fittings and with gas and electricity services meeting all ordinary requirements. Library space is provided on an ample scale and a microfilm apparatus is already installed and in use. The photographic department is adequate and well designed.

For experimental transmission experiments with tsetse, commodious insectaries and insect-proofed houses are provided. One important and interesting feature to which the Director attaches special importance is the provision of both laboratory and living accommodation for visiting workers. This makes the Institute an ideal centre for special investigations by outside workers and advantage has already been taken of this valuable hospitality.

There is good living accommodation for twenty scientific workers and for about 100 technical staff. All senior staff are at present Europeans but the remaining appointments are being filled by Africans as suitable candidates present themselves from what is at present a very small field of recruitment.

On the administrative side, the Institute has the advantage of now being an autonomous body governed by its own managing committee. This gives it great freedom in managing its own affairs and especially in directing its research activities in the directions considered most profitable.

As most of the time which has elapsed since the initiation of the project has been spent in building operations and general organization and recruitment, it has naturally not been possible to do much laboratory research and the Director has wisely not attempted it but has concentrated on field studies, some of which have already yielded interesting results.

The stage, however, is now set ; the buildings and equipment are there and the senior scientific staff recruited. The early stages of the enterprise have been so successfully accomplished that one now looks with confidence for similarly successful scientific achievements. *H. E. Shortt*

COLBOURNE, M. J., EDINGTON, G. M. & HUGHES, M. H., with the assistance of A. WARD-BREW. **A Medical Survey in a Gold Coast Village.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Dec., v. 44, No. 3, 271–90. [16 refs.]

[It is now well known that an accurate picture of the health of a community in a country in which the reporting of disease is incomplete, and in which the medical service is as yet inadequate, can best be obtained by a survey deliberately carried out. In some countries surveys have been started and have been continued for long periods, as in the Belgian Congo, but apart from such large undertakings there have been others, conducted on a small scale

and for a limited period, which have added considerably to our knowledge of the people of these primitive areas. Perhaps the most important feature of such surveys is that they indicate the desire of the medical men who conduct them to find, not so much the rare conditions, as the conditions which lead to the greatest amount of ill health and which therefore need most attention.]

The present survey was made in a village of 255 inhabitants, 60 miles from Accra and 3 miles from a large African town, situated near the southern edge of the central rain forest where cocoa is grown. It is not quite clear how long the survey took, but the authors established a clinic which they attended twice each week, and an African laboratory assistant was stationed there for 6 weeks. A census was made which showed that there were 114 males and 141 females, the latter probably including a number of women attracted from elsewhere by the prospect of treatment.

Details of the findings are too numerous to be reproduced in an abstract. The chief conclusions are as follows : The diet was found to be poor in protein, and there were signs of anaemia and malnutrition, including enlargement of the liver. Child mortality was evidently high, and the most critical period for these African children is the time of weaning. Malaria was common, the chief vector being *Anopheles gambiae* ; the commonest parasite was *P. falciparum*, but *P. malariae* was often found, though not after the age of 9. *P. vivax* was also found. Hookworm infection was found in 52 per cent., *Ascaris* in 75·8 per cent., and *Schistosoma haematobium* in 9·1 per cent. of the people. Skin smears showed microfilariae of *Dipetalonema streptocerca* in 20·9 per cent. but no other filarial embryos were found. *Dracunculus medinensis* was found in only one person, though 51·8 per cent. gave a history of this infestation.

The Kahn test was performed on 255 persons, and was positive in 147. No syphilis was seen, and the authors think that the positive results were due to yaws, of which 195 persons gave a history.

The authors point out that though trypanosomiasis is not found in these villagers, the animal trypanosomiasis precludes the keeping of stock, and therefore seriously interferes with nutrition. For improvement in health it would be necessary to improve agricultural and stock-raising practices as well as to institute direct measures against malaria and other diseases.

These villagers, " like those of every other African village, are unashamedly and infectiously happy, in spite of their appalling load of physical handicaps."

[The authors are to be congratulated on the distinguished style of their account of this interesting and important work.] *Charles Wilcocks*

MANSON-BAHR, P. **Fiji Revisited.** *Lancet.* 1951, Jan. 6, 49.

In this short note the author pays a generous tribute to the work done in Fiji by the British Administration, and especially the medical service, since he last visited the islands in 1911. The pattern of disease has altered in that period, and whereas bacillary dysentery (which he originally went to investigate) has now greatly diminished, there still remain the problems of pulmonary tuberculosis, kwashiorkor, megalocytic anaemia and other conditions, which require investigation.

In 1910 the author found that the non-periodic form of *Wuchereria bancrofti* was transmitted by *Aëdes scutellaris* var. *pseudoscutellaris*, which breeds in small collections of water, or in small pools, tins, coconut shells and crab-holes. He now mentions another variety, *A. scutellaris* var. *horrescens*, which breeds in water in the axils and branches of forest trees, and in tree holes, but states that the evidence indicates that this variety is probably not capable of transmitting *W. bancrofti*. This is important because control would be most difficult. *Charles Wilcocks*

WRIGHT, W. H. **Medical Parasitology in a Changing World. What of the Future ?** *J. Parasitology.* 1951, Feb., v. 37, No. 1, 1–12, 1 fig. [19 refs.]

In this, the 1950 Presidential Address to the American Society of Parasitologists, Dr. Willard H. Wright reviews some of the successes and failures experienced by workers in tropical medicine and discusses the problems which are awaiting solution both at home and in the tropics. Dr. Wright supports the view that wherever it is reasonable to believe that a disease can be reduced or eliminated in a community this should be done, provided that the means and the funds are available. Furthermore, he believes that the greater production and expansion of trade observed to follow the introduction of such control measures is evidence that the inhabitants of such communities, as well as those in communities receiving the expanded trade, have benefited. He agrees that the increase in production is, in part, the result of population growth, but he supports the view put forward by an American businessman's magazine that "Colonial public-health programs made possible India's and Indonesia's enormous population growth, which is troublesome but not basic, for that growth measures the first stage of economic development." Not all economists, or for that matter all parasitologists, will agree with these views but Dr. Wright is on far less controversial ground when, with great lucidity and in a suprisingly short space, he discusses the various problems in helminthology, protozoology and entomology which still require a solution.

This is a stimulating address which defies further summarization and which should be read in full by all persons interested in the progress of parasitology. *R. M. Gordon*

BOTMAN, T. Verslag van het Pathologisch Laboratorium Medan over 1941–1949. [**Report of the Medan Pathological Laboratory, Sumatra, for 1941–1949.**] *Med. Maandblad.* Djakarta. 1950, v. 3, Suppl. 78 pp., 7 graphs.

The first part of the report deals with the history of the laboratory during the war. From 1941 to March 1942 large stocks of apparatus and materials were accumulated in anticipation of probable shortages, and the staff were occupied with Red Cross and A.R.P. duties. In March 1942 the invasion occurred and a Japanese military government was set up. The functioning of the laboratory was not interfered with at this time, and supplies and material were granted as requested. The Indonesian staff remained loyal throughout the whole period of occupation. There was a rise in the demand for vaccines of all kinds, and production was increased accordingly. Smallpox vaccine had to be tested on children on account of the lack of experimental animals, and difficulties were encountered in making diphtheria prophylactic as the strains isolated were not good toxin producers. The manufacture of condensed milk was expanded throughout the country, and the laboratory was called upon to do analyses of fat, protein and sugar in order to control production. In February 1943 a Japanese civil administration took control. A Japanese director was placed in charge of the laboratory, and two Japanese workers with very limited scientific ability were placed on the staff. Many of the Dutch workers were interned and conditions became very difficult. In September 1943 the laboratory was taken over entirely by the Japanese, and was mostly evacuated to Bunut and Berastagi ; little is known about conditions in the laboratory during this time. After the Japanese defeat in 1945 the laboratory was found to be in a bad state of repair and much material and equipment had been lost or ruined. The remaining stores were gradually collected and brought back to Medan, an operation which was made difficult by the growing nationalist movement. A part of the laboratory was occupied meanwhile by

the medical services of the British forces. In June 1946 it was possible to re-occupy the building and the activities of the laboratory have gradually been restored since then. The second and main part of the report consists of an account of the routine activities of the various departments in the period under review. *D. J. Bauer*

BOYD, J. S. K. **Chemotherapy in Tropical Diseases.** *Practitioner.* 1951, Apr., v. 166, No. 994, 366–72. [19 refs.]

A review.

ERRATUM

In summary of Rockefeller Foundation report, this *Bulletin*, 1951, v. 48, on p. 97, para. 2, line 4, for *Otoibus* read *Otobius*.

BOOK REVIEW

NICHOLLS, Lucius [C.M.G., M.D., B.C., B.A. (Cantab.)]. **Tropical Nutrition and Dietetics.** 3rd Edition. pp. ix+476, 57 figs. (33 on 16 pls.) & 17 graphs. 1951. London : Bailliére, Tindall & Cox, 7 & 8, Henrietta Street, W.C.2. [42*s*.]

The appearance of a third edition of this book is a tribute both to the quality of the book and the importance of the subject. A new chapter on the Processing and Preparation of Foods has been added and the sections on Classification of Foodstuffs expanded to four chapters. These additions are very good. So also are the revised sections on Institutional Diets, Nutritional Surveys and Food Poisoning.

In a large book on a rapidly expanding subject there must be legitimate differences of opinion on the relative importance of different aspects. Thus the chapter on Disorders of Malnutrition seems disappointing. It is divided into twelve sections, apparently in order of importance. Beriberi comes first, liver damage and cirrhosis of nutritional origin sixth and starvation tenth. On current form this is a strange batting order. The section on starvation and famine relief is very brief and quite out of proportion to the importance of the subject. It is unfortunate that no reference is made to the excellent nutritional work of the various United Nations organizations in the tropics and, especially in view of the author's personal experience, no discussion of the nutritional implications of the great Commonwealth Colombo plan for South-East Asia.

But these are minor criticisms. The book is very good. It is a mine of practical information and in no other volume is so much useful knowledge on the subject collected together. Every medical library in the tropics, public or private, large or small, is advised to purchase a copy. [For review of the second edition of this book, see this *Bulletin*, 1946, v. 43, 165.]

R. Passmore

Printed under the authority of HIS MAJESTY'S STATIONERY OFFICE
by The South Essex Recorders, Ltd., Ilford.

(543) Wt. P27/388 9/51 S.E.R. Ltd. Gp. 432